FOR CONTRACT NO.: 04-3A4004

INFORMATION HANDOUT

AGREEMENTS

UNITED STATES FISH AND WILDLIFE SERVICE (Biological Opinion)

ROUTE: 04-SCL-152, PM 19.3/20.3

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To:
81420-2009-F-1157

SEP 25 2009

Mr. Jim Richards
Attn: Monica Gan
Office of Biological Sciences and Permits
California Department of Transportation
P.O. Box 23660
Oakland, California 94623-0660

Subject: Reinitiation of Consultation and Amendment to the Biological Opinion on the Effects of the State Route 152 Safety Operational Improvements Project in Santa Clara County, California (Caltrans EA 04-3A4002)

Dear Mr. Richards:

This letter is an amendment to the Biological Opinion issued on April 26, 2006 (Service File No.: 1-1-06-F-0024), for the State Route 152 Safety Operational Improvements Project in Santa Clara County, California (Caltrans EA 04-3A4002). Reinitiation of consultation was triggered by a modification of the project description, which resulted in changes in the effects of the proposed action that affect listed species. At issue are the effects of the project on the endangered San Joaquin kit fox (*Vulpes macrotis mutica*), threatened Central California DPS California tiger salamander (*Ambystoma californiense*), and threatened California red-legged frog (*Rana aurora draytonii*). Reinitiation of consultation is exercised under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

On May 6, 2009 Caltrans requested reinitiation of formal consultation to address changes in Segment C – the westbound left-turn pocket at San Felipe Lane (Dunne Lane) – of the State Route 152 Safety Operational Improvements Project. This project comprised four separate components, i.e. segments A-D, of which Segment D has been fully constructed. Segment C has been redesigned primarily to accommodate wider lanes, shoulders and center, while providing appropriate slopes for roadbeds and drainage. As such, the total project footprint has increased from 1.77 acres (ac) to 2.90 ac. The wider design will result in a larger area being permanently and temporarily affected; however, the affected area assumptions remain unchanged. Permanent effects are still assumed in areas between the existing edge of pavement and the cut-fill lines, and temporary effects are assumed in areas between the cut-fill lines and the temporary construction easement lines. Existing pavement areas (driveways, parking lots, etc.) were subtracted from the total areas, since they are not suitable habitat for listed species.

The following changes are made to the April 26, 2006, biological opinion:

TAKE PRIDE IN AMERICA

1. Add the following to the Consultation History:

   May 20, 2009 The Service received a letter from Caltrans dated May 6, 2009 requesting reinitiation of formal consultation to address project redesign modifications to Segment C of the Safety Operational Improvements Project.

2. Add the following paragraph to Proposed Conservation Measure 16 on page 10 to address the increased effected acreage on Segment C of the proposed action from:

   Segment C

   The effects to San Joaquin kit fox from the permanent loss of 1.34 ac of habitat will be compensated at 3:1 (4.02 ac). The effects to California red-legged frog from the permanent loss of 1.34 ac of habitat will be compensated at 3:1 (4.02 ac). The effects to California tiger salamander from the permanent loss of 1.34 ac of habitat will be compensated at 3:1 (4.02 ac).

3. Change Proposed Conservation Measure 17 on page 10 to include language addressing increased effected acreages on Segment C of the proposed action from:

   The temporary effects to 19.75 acres (8.00 hectares) of San Joaquin kit fox habitat will be compensated at 1.1:1 (21.73 acres [8.79 hectares]). Caltrans will receive a 1:1 credit (19.75 acres [8.00 hectares]) for temporary effects compensation through adequate on-site restoration of temporarily effected San Joaquin kit fox habitat. In such an event, Caltrans will need to compensate 0.1:1 (1.98 acres [0.80 hectares]). Onsite restoration and compensation of San Joaquin kit fox habitat also will satisfy the needed restoration and compensation requirements for the temporary effects to 19.75 acres (8.00 hectares) of California red-legged frog habitat and the temporary effects to 19.75 acres (8.00 hectares) of California tiger salamander habitat.

   Compensation for the permanent and temporary effects to all three species is 31.83 acres (12.88 hectares). Purchase of conservation bank credits, contribution to the purchase of habitat acquisition or contribution to an in lieu fee program that complies with FHWA policy for Federal aid participation can be shared for more than one of the three species if the habitat is appropriate for all three species. The total payment obligation to compensate for the permanent and temporary effects to all three species shall not exceed $477,450 (31.83 acres x $15,000 acre). Because the project is divided into four (4) individual phases/segments, compensation for each phase's effects will be contributed as each segment is constructed. Segment A of the project has no compensation requirement, as there are no effects to the species. Segment B will contribute $233,950. Segment C will contribute $23,873. Segment D will contribute $219,627.

   Sufficient funds for the compensation requirements for impacts to California red-legged frog, California tiger salamander, and San Joaquin kit fox associated with the State Route 152 projects will be budgeted. Caltrans will expend the funds to either purchase credits at a Service-approved approved conservation bank, contribute to habitat acquisition, or contribute to an in lieu fee program that complies with FHWA policy for federal aid participation.

To:

The effects to San Joaquin kit fox for the temporary loss of habitat will be compensated at 1.1:1. Caltrans will receive a 1:1 credit for this compensation by on-site restoration of temporarily affected San Joaquin kit fox habitat. In such an event, the remaining compensation obligation will be 0.1:1. Onsite restoration of San Joaquin kit fox habitat also will satisfy the needed restoration requirements for the temporary effects to California red-legged frog and California tiger salamander habitat.

Compensation for the permanent and temporary effects to all three species is 34.42 ac. Purchase of conservation bank credits, contribution to the purchase of habitat acquisition or contribution to an in lieu fee program that complies with FHWA policy for Federal aid participation can be shared for more than one of the three species if the habitat is appropriate for all three species. The total payment obligation to compensate for the permanent and temporary effects to all three species shall not exceed $516,217 (34.42 ac x $15,000 ac). Because the project is divided into four (4) individual phases/segments, compensation for each phase's effects will be contributed as each segment is constructed. Segment A of the project has no compensation requirement, as there are no effects to the species. Segment B will contribute $233,950. Segment C will contribute $62,640. Segment D will contribute $219,627.

Sufficient funds for the compensation requirements for effects to San Joaquin kit fox, California tiger salamander and California red-legged frog associated with the State Route 152 projects will be budgeted. Caltrans will expend the funds to: 1) purchase credits at a Service-approved approved conservation bank, 2) acquire, protect and manage habitat in perpetuity, or 3) contribute to an in lieu fee program that complies with FHWA policy for federal aid participation.

4. The following Amount or Extent of Take under the Incidental Take Statement on page 52 has been modified to address Segment C:

San Joaquin Kit Fox

The Service expects that incidental take of the San Joaquin kit fox will be difficult to detect or quantify for the following reasons: the nature of the species and its cryptic behavior make the finding of an injured or dead individual unlikely, and the animal occurs in habitat that makes it difficult to detect. Due to the difficulty in quantifying the number of San Joaquin kit fox that will be taken as a result of the proposed action, the Service anticipates take in the form of harm and harassment of one (1) juvenile or adult kit fox within the action area as a result of habitat loss/degradation, construction-related disturbance; mortality of any kit fox life history stage is not anticipated. Upon implementation of the following Reasonable and Prudent Measures, incidental take of one (1) juvenile or adult San Joaquin kit fox in the form of harm and harassment within the action area will become exempt from the prohibitions described under section 9 of the Act resulting from the proposed action. Mortality of San Joaquin kit fox is not authorized under this opinion.

Central California DPS California Tiger Salamander

The Service anticipates that incidental take of the Central California DPS California tiger salamander will be difficult to detect because this amphibian spends the majority of its adult life within underground networks of burrows, only venturing out at night during the summer and fall months to relocate to another nearby burrow. Losses of this species may also be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in the water regime at their breeding ponds, or additional environmental disturbances. Due to the difficult in quantifying the number of California tiger salamanders that will be taken as a result of the proposed action, the Service anticipates take in the form of harm and harassment of all individuals within the action area as a result of habitat loss/degradation, construction-related disturbance, and capture, handling and relocation; and mortality of one (1) individual from construction-related disturbance. Upon implementation of the following Reasonable and Prudent Measures, incidental take of all juvenile or adult California tiger salamanders in the form of harm and harassment and mortality of one (1) individual within the action area will become exempt from the prohibitions described under section 9 of the Act resulting from the proposed action. No other forms of take are authorized under this opinion.

California Red-Legged Frog

The Service anticipates that incidental take of the California red-legged frog will be difficult to detect for the following reasons: their relatively small body size make the finding of a dead specimen unlikely; the secretive nature of the species; losses may be masked by seasonal fluctuations in numbers or other causes; and the species occurs in habitats that makes it difficult to detect. Due to the difficult in quantifying the number of California red-legged frogs that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as all California red-legged frogs inhabiting or utilizing the 1.008 ac of suitable habitat identified in the Biological Assessment. The Service anticipates take of California red-legged frogs in the form of harm and harassment of all individuals within the action area as a result of habitat loss/degradation, construction-related disturbance, and capture, handling and relocation; and mortality of one (1) individual from construction-related disturbance. Upon implementation of the following Reasonable and Prudent Measures, incidental take of all California red-legged frogs in the form of harm and harassment and mortality of one (1) individual within the action area will become exempt from the prohibitions described under section 9 of the Act resulting from the proposed action. No other forms of take are authorized under this opinion.

5. Change Term and Condition 2.f. on page 55, from:

   f. Biologists shall take precautions to prevent introduction of amphibian diseases to the action area by disinfecting equipment and clothing as directed in the October 2003 California tiger salamander survey protocol titled, Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander and the recommended equipment decontamination procedures within the Service's California Red-Legged Frog Survey Guidance. Both items are available at the Service's Sacramento office website (http://www.fws.gov/sacramento/es/protocol.htm). Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle salamanders or frogs after working in other aquatic habitats.

To:

f. If California red-legged frogs or California tiger salamanders are encountered in the action area, work that could result in harm or mortality should cease immediately and the Resident Engineer shall be notified. Based on the professional judgment of the Service-approved biologist, if project activities can be conducted without causing harm or mortality to California red-legged frog(s) or California tiger salamander(s), the individual(s) shall be left at the location of discovery and monitored by the Service-approved biologist. All project personnel shall be notified of the finding and at no time shall work occur within the vicinity of the listed species without a biological monitor present. If it is determined by the Service-approved biologist that relocating the California red-legged frog(s) or California tiger salamander(s) is necessary, the following steps shall be followed:

   i. Prior to handling and relocation the Service-approved biologist shall take precautions to prevent introduction of amphibian diseases in accordance with the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (Service 2005) and *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (Service 2003). Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle amphibians after working in other aquatic habitats.

   ii. California red-legged frogs and California tiger salamanders shall be captured by hand, dipnet or other Service-approved methodology, transported by hand, dipnet or temporary holding container, and released as soon as practicable the same day of capture. Handling of California red-legged frogs and California tiger salamanders shall be minimized to the maximum extent practicable. Holding/transporting containers and dipnets shall be thoroughly cleaned and disinfected prior to transporting to the action area and shall be rinsed with freshwater onsite immediately prior to usage unless doing so would result in the injury or death of an individual frog or salamander due to the time delay.

   iii. California red-legged frogs and California tiger salamanders shall be relocated to the nearest suitable habitat outside of the area where actions would result in harm or harassment and released on the same side of SR 152 where it was discovered. If salamanders are captured from burrows, they shall be relocated to the nearest active burrow network outside of the work zone. The release burrow(s) shall be actively occupied by ground squirrels, since inactive burrows can collapse if not maintained. No more than two juvenile or adult salamanders shall be released into the same burrow. Transporting California red-legged frogs and California tiger salamanders to a location other than the location described herein shall require written authorization of the Service.

The remainder of the April 26, 2006 Biological Opinion is unchanged. This concludes formal consultation on the State Route 152 Safety Operational Improvements Project in Santa Clara County, California. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have questions concerning this opinion on proposed State Route 152 Safety Operational Improvements Project, Santa Clara County, California, you can contact Jerry Roe or Ryan Olah at (916) 414-6600.

Sincerely,

for Susan K. Moore
Field Supervisor

cc:
Margaret Gabil, California Department of Transportation, Oakland, CA
Melissa Escaron, California Department of Fish and Game, Oakland, CA
Liam Davis, California Department of Fish and Game, Yountville, CA
Scott Wilson, California Department of Fish and Game, Yountville, CA

LITERATURE CITED

U. S. Fish and Wildlife Service. 2003. Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander. October.

_____ 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. August

230.33

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

IN REPLY REFER TO:
1-1-06-F-0024

APR 26 2006

Mr. Gene Fong
Federal Highway Administration
Department of Transportation
650 Capital Mall, Suite 4-100
Sacramento, California 95814

Subject: Biological Opinion for the Proposed State Route 152 Safety Operational Improvements Project in Santa Clara County, California (Caltrans EA 174931)

Dear Mr. Fong:

This is in response to your September 12, 2005, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed State Route 152 Safety Operational Improvements Improvement Project in Santa Clara County, California. Your request was received in this office on September 15, 2005. This document represents the Service's biological opinion on the effects of the proposed action on the endangered San Joaquin kit fox (*Vulpes macrotis mutica*), threatened California tiger salamander (*Ambystoma californiense*), and threatened California red-legged frog (*Rana aurora draytonii*); and the effects of the proposed action on critical habitat for the California tiger salamander. This document has been prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

This biological opinion is based on: (1) informal consultation conducted for the project in 2000 and 2001; (2) a request to reinitiation consultation for the project due to the subsequent listing of the California tiger salamander and a Biological Assessment concerning the California tiger salamander, dated September 2005; (3) additional project information provided by the California Department of Transportation (Caltrans) on November 18, 2005, March 21, 2006, and March 29, 2006; (4) a Focused Biological Assessment for the California red-legged frog, dated November 2005; (5) the April 6, 2006 meeting between Caltrans and the Service, (6) miscellaneous correspondence and electronic mail concerning the proposed action between the Service and Caltrans; and (7) other information available to the Service.

Consultation History

February 10, 2000	The Service received the Natural Environmental Study for the State Route 152 Safety Operational Improvements, Santa Clara County, California from the Federal Highway Administration (FHWA).
April 13, 2000	The Service sent FHWA a letter in response to their February 9, 2000 letter requesting concurrence that the proposed State Route 152 project is not likely to adversely affect the federally endangered San Joaquin kit fox, the threatened California red-legged frog, and the California tiger salamander. The Service concurred with the determination that the proposed project was not likely to adversely effect the California red-legged frog provided the implementation of the proposed minimization and protection measures. The Service did not concur with the San Joaquin kit fox determination and requested that Caltrans request formal consultation. Caltrans also confirmed that a center median/concrete barrier had been eliminated from the project design.
May 22, 2001	The Service received a letter from Caltrans describing studies that were being conducted to support baseline wildlife activity near the action area and to confirm incorporation of design features intended to encourage safe wildlife passage under State Route 152.
August 3, 2001	The Service sent FHWA a letter in response to their May 22, 2001 letter requesting concurrence that the proposed State Route 152 project is not likely to adversely affect the federally endangered San Joaquin kit fox. The Service concurred with the determination given the installation of a diversion fence and the enlargement of two existing culverts.
September 15, 2005	The Service received the Focused Biological Assessment for California Tiger Salamander from FHWA to initiate consultation on the California Tiger Salamander, dated July 2005, and a letter requesting the initiation of consultation, dated September 12, 2005.
September 29, 2005	The Service requested additional information that was not provided in the Biological Assessment via an electronic mail message to Amy Fowler of Caltrans.
December 18, 2005	The Service received additional project information from Caltrans, intended to address the Service's September 29, 2005 request.
December 9, 2005	The Service received the Focused Biological Assessment for the California Red-legged Frog from Caltrans, dated November 2005.

March 21, 2006	The Service received additional project information from Amy Fowler of Caltrans via electronic mail.
March 23, 2006	Caltrans requested a copy of the draft biological opinion for the State Route 152 project from the Service via electronic email.
March 23, 2006	Tom Fitzwater of the Santa Clara Valley Transportation Authority left a voicemail with Chris Nagano of the Service regarding discussions with Caltrans concerning the compensation agreement for the State Route 152 project within Santa Clara County.
March 23, 2006	The Service responded to Caltrans' March 23, 2006 request via electronic mail that the draft biological opinion would not be complete until information regarding Caltran's compensation agreement had been received.
March 24, 2006	Caltrans repeated their request for a copy of the draft biological opinion for the State Route 152 project from the Service via electronic email. In addition, they requested rationale behind the Service's position requiring Caltrans to seek compensation for the California tiger salamander and the California red-legged frog within an area of Santa Clara County within the range of the San Joaquin kit fox.
March 28, 2006	The Service responded to the March 23, 2006 request via email that a draft could not be completed, until the issue regarding compensation was resolved. A copy of the project description was sent to Caltrans via electronic mail for review.
March 29, 2006	The Service received a revised copy of the project description via electronic mail.
April 6, 2006	The Service met with Caltrans to discuss a compensation agreement for the project effects. The Service also requested removal of the wildlife diversion fence from the project design.
April 13, 2006	Caltrans provided language describing their commitment to provide compensation for the project's effects to San Joaquin kit fox, California tiger salamander, and California red-legged frog via electronic message.
April 20, 2006	Caltrans sent an electronic mail message to the Service requesting the biological opinion be issued for the Highway 152 project.
April 21, 2006	Caltrans sent two electronic mail messages to the Service requesting the biological opinion be issued for the Highway 152 project.

BIOLOGICAL OPINION

Description of the Proposed Action

Caltrans, in conjunction with the FHWA, is proposing safety/operational improvements along a portion of State Route 152 in southern Santa Clara County between Prunedale Avenue and a location on State Route 152, 0.5 miles (8.0 kilometers) west of the State Route 152/State Route 156 junction. The project has been divided into four segments (Segments A-D) and the safety and operation improvements include roadway widening and the addition of turn pockets.

General Scope of Work
All expansion of the paved surface of the road will take place on the north side of the existing roadway with the exception of the easternmost portion of the truck-climbing lane (segment D), where an additional lane will be constructed on the north and south sides of the existing roadway. The pavement will not be expanded laterally along the remainder of the south side of State Route 152. However, a narrow strip of fill will be added to maintain the slope of the shoulder along much of the south side of the road as the existing pavement is elevated. The four proposed improvements are summarized as follows for the four individual project segments. The segments are sequential from west to east.

- Segment A. For Segment A, an eastbound left-turn pocket is proposed at the intersection of State Route 152 and Prunedale Avenue. The limit of work will be from 0.6 miles (0.9 kilometers) west of Prunedale Avenue to 0.3 miles (0.5 kilometers) west of Bloomfield Avenue and will consist of a 12 foot (3.6 meter) -wide and 540 foot (165 meter) -long storage lane with 8 foot (2.4 meter) shoulders, a 3.3 foot (1.0 meter) choker section (where the turn lane narrows to join through lanes), and a 1:4 fill slopes and a 1:2 cut slope.

- Segment B. Segment B consists of east and westbound passing lanes proposed between Bloomfield Avenue and Old Lake Road. The limit of work will be approximately 0.75 miles (1.2 kilometers) long in each direction separated by a 14 foot (4.3 meter) wide median. The passing lanes will improve safety and operation and will include 12 foot (3.6 meter) lanes. Shoulders will also be widened to 8 feet (2.4 meters) and will have a 1:4 fill slope and a 1:2 cut slope.

- Segment C. Segment C includes the construction of a westbound left-turn pocket at San Felipe (Dunne) Lane. The limit of work is be from Holstein Creek Bridge to a point 1.1 miles (1.7 kilometers) east of Holstein Creek Bridge and will consist of a 12 foot (3.6 meter) -wide and 670 foot (205 meter) -long storage lane with 8 foot (2.4 meter) shoulders, 1:4 fill slopes, and 1:2 cut slopes.

- Segment D. Segment D would include the addition of an eastbound truck climbing lane from 0.1 miles (0.2 kilometers) east of San Felipe (Dunne) Lane to the crest of a hill approximately 0.9 miles (1.4 kilometers) west of the State Route 152/State Route 156 junction. The truck climbing lane is intended to improve traffic safety and operation and consists of a 12 foot (3.6 meter) -wide lane with shoulders widened to 8 feet (2.4 meters) and a 4 foot (1.2 meter) median with a 1:2 fill slope and a 2:3 cut slope. Segment D will also include an 803.8 foot (245 meter) -long and 5.9 to 38.1 foot (1.8 to 11.6 meters) -high, soil nail wall along the northeast side of State Route 152; and a 360.9 foot (110 meters) -long, 7.9 to 16.7 foot (2.4 to 5.1 meters) -high retaining wall.

The project will include the combined addition of 4.6 acres (1.9 hectares) of impervious pavement. Permanent effects will amount to approximately 9.95 acres (4.03 hectares) of areas other than existing hardscape.

The proposed project would include the temporary disturbance of approximately 19.77 acres (8.0 hectares). Caltrans characterizes areas of the temporary effects on this project as those that will be restored to baseline habitat values following construction. Actions in these areas will primarily include placement of fill and cutting back of slopes. Areas beyond the cut and fill lines that are within the temporary construction easements will be used for contractor access to the construction areas and staging. The effects in these areas will be primarily from construction equipment utilizing the area.

Areas of temporary effects will be stabilized with the use of erosion control measures such as fiber rolls, compost, stabilizing emulsion and straw. The areas will also be seeded with a native seed mix. Additionally, a total of 35 coast live oaks will be planted on the south side of the project.

Construction Schedule

Caltrans will construct the four project segments in separate phases. The proposed construction schedule targets construction to begin on Segment D in Spring 2007. Segments A and C are expected to begin construction in Spring 2008. Segment B is scheduled to begin construction in Fall 2009. Construction of each segment will start between April 1st and October 31st. The work schedule may change due to unforeseen funding issues.

For construction that needs to be completed after November 1st of a given year, exclusion fencing will be installed on the edge of the work area adjacent to the construction activities. The exclusion fencing will consist of constructed of standard plywood sheets and will extend along the work area boundary, at least 300 feet (90 meters) beyond the areas of active construction.

The majority of the construction work will take place during daylight hours behind the K-rail boundaries. However, placement of a temporary concrete barrier (K-rail); placement of temporary crash cushion; laying asphalt concrete, removal of pavement delineation, and installation of new pavement delineation will likely occur at night to avoid peak traffic.

Construction Activities
The first order of work on each segment will be the placement of K-rail along the existing edge of pavement or the newly constructed edge of pavement. Temporary crash cushions filled with sand will be placed at the ends of the K-rails. The K-rails are intended to provide a safety barrier between the vehicle traffic on State Route 152 and the improvement work that will primarily be taking place outside the existing roadway.

Construction in all four segments will likely begin with clearing and grubbing of vegetation and obstructions within areas of temporary and permanent disturbance, followed by excavation and embankment of earthwork for cut and fill activities.

Construction of the soil nail wall and the retaining wall in Segment D will involve the excavation of vertical wall cuts followed by installation of the secure wall structures.

The new pavement in Segment D will consist of a 7.7 inch (195 millimeter) layer of asphalt concrete, 9.4 inches (240 millimeters) of concrete treated base, and 8.3 inches (210 millimeters) of an aggregate sub-base. The dimension of the new pavement will be 1.5 miles (2.4 kilometers) long and 23.6 feet (7.2 meters) wide, which equates to 0.01 square miles (16,920 square meters). Stressed pavement will be repaired in the existing roadway and new pavement will be applied to areas in need of elevation and cross-slope correction.

The proposed project will include the improvement of associated drainage features such as drainage dikes and cross-road culverts as well as associated erosion control features such as filter fabric and rock slope protection. Runoff will be directed to the culvert inlets with asphalt concrete dikes which will be constructed along the edge of the roadbed. The current roadway within the four project segments includes 18 existing culverts. Of these, eleven will be abandoned and replaced by new culverts, six will be extended, and one will be abandoned.

The new culverts in Segment D will be larger than the existing culverts that are being replaced. Four existing 18 inch (450 millimeter) culverts will be replaced with 24 inch (60 centimeter) culverts. Two other existing 18 inch (450 millimeter) culverts will be replaced with 30 inch (75 centimeter) and existing 30 inch (75 centimeter) culverts will be replaced with 47.2 inch (120 centimeter) culverts.

Of the six existing culverts in Segment D that will be extended, five are 18 inch (45 centimeter) corrugated pipe culverts and one is a 94.5 inch x 94.5 inch (240 centimeter x 240 centimeter) box culvert.

As an operational safety measure, metal beam guard rails with wooden posts will be installed along the road.

The project design was revised during informal consultation with the Service in 2001 to include a fence intended to direct wildlife, primarily San Joaquin kit fox, around the area of widened road in Segment D and towards the culvert undercrossings. The wildlife fencing would be placed on the east and west sides of State Route 152 for the approximately 0.9 miles (1.4 kilometers) of Segment D. The wildlife fence would be of stock fence design, with a 2 inch (50.8 millimeter) square mesh on the bottom, and three strains of barb wire on the top. Two gates would be located on both the east and west fences to allow wildlife to escape (but not enter) should they become trapped between the fence and State Route 152.

At an April 6, 2006 meeting with the Service, Caltrans and FHWA agreed to remove the wildlife diversion fence from the project design. Although widening the roadway in Segment D may increase the risk of road mortality for the San Joaquin kit fox, the Service requested that the proposed wildlife fencing be removed from the project design based on insufficient rationale for the effectiveness of such a feature in significantly reducing potential road mortalities or improving wildlife movement for the San Joaquin kit fox for this particular project location. Modeling studies suggest that fencing along roads may not be effective in areas where road kill is not considered a significant source of mortality or in areas where a given species is utilizing habitat on both sides of the road (Jaeger and Fahrig 2004). Road kill is not considered a significant source of San Joaquin kit fox mortality in the western boundaries of its range where kit fox populations and urbanization is relatively low (Cypher 2005). The primary threat to San Joaquin kit fox in the project area is loss of habitat. The installation of larger culverts included in the project design may provide more effective safe passage for kit fox. The Service was also concerned about the risk of kit foxes becoming trapped between the road and the wildlife fence. The fence design included escape exits to address entrapment; however there was a lack of evidence to suggest that this species would effectively use them. The proposed wildlife fencing may not be effective in achieving its intended purpose and there is the potential for the fence to be detrimental to the species for this particular project. Similar or other wildlife fencing may be more appropriate for reducing San Joaquin kit fox mortalities in other areas of its range. The Service recognizes that the post-construction surveys described later in this project description were intended in association with the proposed wildlife fence. The Service does not expect Caltrans to conduct the post-construction surveys if the wildlife fence is not installed.

Equipment
The equipment used on the proposed project will ultimately be up to the contractor's discretion. Clearing and grubbing typically involves the use of excavators, dozers, mulchers, and dump trucks to remove tree stumps, and brush located within the proposed work areas. Dozers and excavators will likely be used for general grading and contouring. Rollers are then used to compact the soil and water trucks are used to aid soil compaction and dust control. Dumptrucks, graders, pavers, and rollers are used to lay the road base and asphalt. Excavators will be used to dig the trenches needed to construct drainage features. Culverts will be installed across the roadbed by using the jack and bore method. This requires small excavation pits on both sides of the road. For most concrete work (including retaining walls), footings and concrete filled areas will be excavated, wood forms erected, and steel reinforcements tied into the wood forms. Concrete trucks will deliver and pump concrete into the forms and a vibrating rod will be used to rid the concrete of air voids. The forms will be removed after the specified curing time. The metal beam guardrail will be installed by drilling postholes with an auger. Pavement delineation,

such as stripping and "bot dots", are installed using specialized equipment that remains on the roadbed.

Construction Site Restoration
Caltrans will contour and revegetate areas of temporary disturbance in order to restore habitat and provide post-construction erosion control. Contouring will include the creation of vegetated swales to direct roadway and shed runoff to the natural drainage system. Biodegradable coir netting and other erosion control measures will be installed to prevent scouring of associated slopes.

Fiber rolls, netting, and hydro-seeding will be used to aid revegetation of all temporary work areas with native vegetation. Temporary slope stabilization will consist of applying biodegradable tackifiers. Permanent hydro seeding will be applied to all slopes once they are completed. The permanent erosion control will include numerous native grass species that would be conducive to the local ecotype. The seed mix for the hydro-seeding applications will likely include silver bush lupine (*Lupinus albinfrons*), pygmy-leaf lupine (*Lupinus bicolor*), tomcat clover (*Trifolium tridentatum*), white yarrow (*Achillea millefolium*), California brome (*Bromus carinatus*), California poppy (*Eschscholzia californica*), California fescue (*Festuca california*), red fescue molate (*Festuca rubra molate*), and purple needlegrass (*Nassela pulchra*). In addition to installing erosion control netting on steep swales, embankment slopes above drainages will also be netted to enhance sediment control. Check dams will also be installed within the drainage system as needed to help prevent scouring.

Post-Construction Surveys
Caltrans will conduct post-construction wildlife surveys intended to assess road mortality and use of culverts for cross-road travel will be conducted in Segment D to compliment associated baseline surveys conducted for the project in 2000. The 2000 survey focused on wildlife use of two existing 18-inch (45.7-centimeter) culverts near post mile 20.35 that will be replaced with new 30-inch (76.2-centimeter) culverts as part of the roadway improvement project (Caltrans 2001). The post construction surveys will consist of a camera survey for wildlife activity and a windshield survey for wildlife activity and road mortality. The Service does not expect Caltrans to conduct post-construction surveys due to their intended association with the performance of the proposed wildlife diversion fence that was removed from the project design following an agreement that was reached between the Service and Caltrans and FHWA on April 6, 2006.

The camera survey will be similar to the 2000 baseline camera study which included the use of remote cameras near three 30-inch (76.2-centimeter) culvert crossings (two enlarged culverts and one existing 30-inch [76.2-centimeter] culvert) along Segment D. The camera stations will be used for a 4.5-month period, from July through mid-November. The camera units used in 2000 were Buckshot 35's infrared and motion detection units, using a Fuji 35mm camera with a 1 minute reset rate after each picture. Similar units will be used for the post construction survey. The camera stations will be set up on the East Side of Route 152, approximately 10 feet (3.1 meters) away from the existing and new culverts. The cameras will be mounted on 4 foot (1.2

meter) stakes driven into the ground. The camera units will be checked weekly, at which time the batteries and film will be replaced

Caltrans will conduct weekly windshield surveys for wildlife activity and road mortality for one year that will consist of driving Segment D and recording the species and locations of dead animals on and near the roadway.

Proposed Conservation Measures
According to the Biological Assessments and information provided by Caltrans on November 18, 2005, Caltrans proposes to avoid, minimize, and compensate for effects to listed species by implementing the following measures:

1. Project-related vehicles will observance a 20 mile (32.2 kilometer) per hour speed limit in the project areas, except on county roads and State and Federal highways.

2. Steep-walled holes or trenches more than 2 feet (0.6 meters) deep will be covered at the close of each working day.

3. All stored construction pipes, culverts or similar structures with a diameter of 4-inches (10.2 centimeters) or greater that have been stored for one or more overnight periods will be investigated for wildlife prior to movement or use.

4. All food-related trash items and scraps will be disposed of in a closed container.

5. No pets will be permitted on the project site.

6. Rodenticide and herbicide use will be restricted in the project areas. Zinc phosphide will be used if rodent control becomes necessary on the project site.

7. A representative will be appointed as a contact source should a kit fox be observed.

8. An employee environmental education program will be conducted.

9. Temporarily impacted areas will be restored to pre-disturbance conditions.

10. For seasonal avoidance of California red-legged frog, construction will not occur from November 1 through March 31 to the extent practicable. If any work remains to be completed after November 1, exclusion fencing will be placed in those areas where construction needs to be completed.

11. A Service-approved biologist will be designated for the project.

12. All fueling and maintenance of vehicles and other equipment will occur at least 65 feet (20 meters) from any riparian habitat or aquatic habitat.

13. Construction will not occur during the California tiger salamander breeding season, from October 15 through April 15, when adult salamanders are more likely to be active above ground. The work window will be April 16 to October 14. Caltrans will install exclusion fencing around any work areas if it is necessary to continue construction activities in segments B, C, or D outside the work window. Exclusionary fencing will consist of taut silt fabric, 24 inches (61 centimeters) in height, staked at 10 foot (3-meter) intervals, with the bottom buried 6 inches (15 centimeters) below grade. Exclusion fencing will be maintained so that it is intact during rain events and 24 hours after any rain event.

14. The resident engineer will halt work and immediately contact the Service-approved, project biologist and the Service in the event that a San Joaquin kit fox, California red-legged frog, or California tiger salamander gains access to a construction zone. The resident engineer will suspend all construction activities in the immediate construction zone until the animal leaves the site voluntarily or is removed by the biologist to a release site using Service-approved transportation techniques.

15. All construction personnel will attend an environmental education program delivered by the Service-approved biologist prior to working on the project site. The program will include an explanation as how best to avoid the accidental take of San Joaquin kit fox, California red-legged frog, or California tiger salamanders. The Service-approved biologist will conduct a training session that would be scheduled as a mandatory informational field meeting by the Caltrans resident engineer for contractors and all construction personnel. The field meeting will include topics on species identification, life history, descriptions, and habitat requirements during various life stages. Emphasis will be placed on the importance of the habitat and life stage requirements within the context of project avoidance and minimization measures. Handouts, illustration, photographs, and project mapping showing areas where minimization and avoidance measures are being implemented will be included as part of this education program. The program will include an explanation of appropriate federal and state laws protecting endangered species as well as the importance of compliance with Caltrans and various resource agency conditions.

16. The permanent effects to 9.95 acres (4.03 hectares) of San Joaquin kit fox habitat will be compensated at 3:1 (29.85 acres [12.08 hectares]). The permanent effects to 9.95 acres (4.03 hectares) of California red-legged frog habitat will be compensated at 3:1 (29.85 acres [12.08 hectares]). The permanent effects to 9.95 acres (4.03 hectares) of California tiger salamander habitat will be compensated at 3:1 (29.85 acres [12.08 hectares]).

17. The temporary effects to 19.75 acres (8.00 hectares) of San Joaquin kit fox habitat will be compensated at 1.1:1 (21.73 acres [8.79 hectares]). Caltrans will receive a 1:1 credit (19.75 acres [8.00 hectares]) for temporary effects compensation through adequate on-site restoration of temporarily effected San Joaquin kit fox habitat. In such an event, Caltrans will need to compensate 0.1:1 (1.98 acres [0.80 hectares]). Onsite restoration and compensation of San Joaquin kit fox habitat also will satisfy the needed restoration and compensation requirements for the temporary effects to 19.75 acres (8.00 hectares) of

California red-legged frog habitat and the temporary effects to 19.75 acres (8.00 hectares) of California tiger salamander habitat.

Compensation for the permanent and temporary effects to all three species is 31.83 acres (12.88 hectares). Purchase of conservation bank credits, contribution to the purchase of habitat acquisition or contribution to an in lieu fee program that complies with FHWA policy for Federal aid participation can be shared for more than one of the three species if the habitat is appropriate for all three species. The total payment obligation to compensate for the permanent and temporary effects to all three species shall not exceed $477,450 (31.83 acres x $15,000 acre). Because the project is divided into four (4) individual phases/segments, compensation for each phase's effects will be contributed as each segment is constructed. Segment A of the project has no compensation requirement, as there are no effects to the species. Segment B will contribute $233,950. Segment C will contribute $23,873. Segment D will contribute $219,627.

Sufficient funds for the compensation requirements for impacts to California red-legged frog, California tiger salamander, and San Joaquin kit fox associated with the State Route 152 projects will be budgeted. Caltrans will expend the funds to either purchase credits at a Service-approved approved conservation bank, contribute to habitat acquisition, or contribute to an in lieu fee program that complies with FHWA policy for federal aid participation.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed action, the action area includes all lands associated with the approximately 27.6 acre (11.2 hectares) project footprint and roads (except for County roads, and State and Federal highways) and other areas accessed by project vehicles.

Status of the Species and Environmental Baseline

San Joaquin Kit Fox

The San Joaquin kit fox was listed as an endangered species on March 11, 1967 (Service 1967) and it was listed by the State of California as a threatened species on June 27, 1971. The *Recovery Plan for Upland Species of the San Joaquin Valley, California* includes this listed canine (Service 1998).

Before 1930 in the San Joaquin Valley, the range of the San Joaquin kit fox extended from southern Kern County north to Tracy in San Joaquin County, on the west side, and near La Grange in Stanislaus County, on the east side (Grinnell et al. 1937; Service 1998). Historically, this species occurred in several San Joaquin Valley native plant communities. In the southernmost portion of the range, these communities included Valley Sink Scrub, Valley Saltbush Scrub, Upper Sonoran Subshrub Scrub, and Annual Grassland. San Joaquin kit foxes also exhibit a capacity to utilize habitats that have been altered by man. This fox species is present in many oil fields, grazed pasturelands, and "wind farms" (Cypher 2000). Kit foxes can inhabit the margins and fallow lands near irrigated row crops, orchards, and vineyards, and may forage occasionally in these agricultural areas (Service 1998). There are a limited number of observations of San Joaquin kit foxes foraging in trees in urban areas (Murdoch et al. 2005). The San Joaquin kit fox seems to prefer more gentle terrain and decreases in abundance as terrain ruggedness increases (Grinnell et al. 1937; Morrell 1972; Warrick and Cypher 1999).

Adult San Joaquin kit foxes are typically solitary during late summer and fall. Adult females begin to excavate and enlarge natal dens in September and October (Morrell 1972). Adult males then join the females in October or November (Morrell 1972). Pups are typically born between February and late March following a gestation period of 49 to 55 days (Egoscue 1962; Morrell 1972; Spiegel and Tom 1996; Service 1998). Mean litter sizes reported for San Joaquin kit foxes include 2.0 pups on the Carrizo Plain (White and Ralls 1993), 3.0 at Camp Roberts (Spencer et al. 1992), 3.7 in the Lokern area (Spiegel and Tom 1996), and 3.8 at the Naval Petroleum Reserve (Cypher et al. 2000). Pups appear above ground at the age of about 3 to 4 weeks, and are weaned at the age of 6 to 8 weeks. Adult San Joaquin kit fox reproductive rates (the proportion of females bearing young) vary annually with environmental conditions, particularly food availability. Annual reproductive rates range from 0 to 100 percent, and reported mean rates include 61 percent at the Naval Petroleum Reserve (Cypher et al. 2000), 64 percent in the Lokern area (Spiegel and Tom 1996), and 32 percent at Camp Roberts (Spencer et al. 1992). Although some yearling female kit foxes will produce young, most do not reproduce until they have reached 2 years-of-age (Spencer et al. 1992; Spiegel and Tom 1996; Cypher et al. 2000). Sometimes juvenile foxes (<1 year old), particularly females, will delay dispersal and may assist their parents in raising the following year's litter of pups (Spiegel and Tom 1996). The young kit foxes begin to forage for themselves at about 4 to 5 months of age (Koopman et al. 2000; Morell 1972).

Although most young kit foxes disperse less than 5 miles (8 kilometers) from their natal home ranges (Scrivner et al. 1987), dispersal distances of up to 76.3 miles (122.8 kilometers) have been documented for the San Joaquin kit fox (Scrivner et al. 1987; Service 1998). Dispersal can be through disturbed habitats, including agricultural fields, and across highways and aqueducts. The age at dispersal ranges from 4-32 months (Cypher 2000). A study of juvenile kit foxes at the Naval Petroleum Reserve found that 49 percent of the male and 24 percent of the female pups dispersed from natal home ranges by July 1 (Koopman et al. 2000). Among dispersing kit foxes, 87 percent did so during their first year of age. Of the dispersing juveniles at the Naval Petroleum Reserve, 65.2 percent died within 10 days of leaving their natal home range (Koopman et al. 2000). Some kit foxes delay dispersal and may inherit their natal home range.

San Joaquin kit foxes are reputed to be poor diggers, and their dens are usually located in areas with loose-textured, friable soils (Morrell 1972; O'Farrell 1983). However, the depth and complexity of their dens suggest that they possess good digging abilities, and occupied kit fox dens have been observed on a variety of soil types (Service 1998). Some studies suggest that where hardpan layers predominate, kit foxes create their dens by enlarging the burrows of California ground squirrels (*Spermophilus beecheyi*) or American badgers (*Taxidea taxus*) (Jensen 1972; Morrell 1972; Orloff et al. 1986). In parts of their range, particularly in the foothills, kit foxes often use enlarged ground squirrel burrows for dens (Orloff et al. 1986). Kit fox dens are commonly located on flat terrain or on the lower slopes of hills. About 77 percent of all kit fox dens are at or below midslope (O'Farrell 1983), with the average slope at den sites ranging from 0 to 22 degrees (California Department of Fish and Game 1980; O'Farrell 1983; Orloff et al. 1986). Natal and pupping dens are generally found in flatter terrain. Common locations for dens include washes, drainages, and roadside berms. Kit foxes also commonly den in human-made structures such as culverts and pipes (O'Farrell 1983; Spiegel et al. 1996).

San Joaquin kit fox natal and pupping dens may include from 2 to 18 entrances and are usually larger than dens that are not used for reproduction (O'Farrell et al. 1980; O'Farrell and McCue 1981). Natal dens may be reused in subsequent years (Egoscue 1962). It has been speculated that natal dens are located in the same location as ancestral breeding sites (O'Farrell 1983). Active natal dens are generally 1.2 to 2 miles (1.9 to 3.2 kilometers) from the dens of other mated kit fox pairs (Egoscue 1962; O'Farrell and Gilbertson 1979). Natal and pupping dens usually can be identified by the presence of scat, prey remains, matted vegetation, and mounds of excavated soil (i.e. ramps) outside the dens (O'Farrell 1983). However, some active dens in areas outside the valley floor often do not show evidence of obvious use (Orloff et al. 1986). During telemetry studies of kit foxes in the northern portion of their range, 70 percent of the dens that were known to be active showed no sign of use (e.g., tracks, scats, ramps, or prey remains) (Orloff et al. 1986). In another more recent study in the Coast Range, 79 percent of active kit fox dens lacked evidence of recent use other than signs of recent excavation (Jones and Stokes Associates 1997).

A San Joaquin kit fox can use more than 100 dens throughout its home range, although on average, an animal will use approximately 12 dens a year for shelter and escape cover (Cypher et al. 2001). Kit foxes typically use individual dens for only brief periods, often for only one day before moving to another den (Ralls et al. 1990). Possible reasons for changing dens include infestation by ectoparasites (parasites that live on but not within their hosts), local depletion of prey, or avoidance of coyotes (*Canis latrans*) or other predators. Kit foxes tend to use dens that are located in the same general area, and clusters of dens can be surrounded by hundreds of acres/hectares of similar habitat devoid of other dens (Egoscue 1962). In the southern San Joaquin Valley, kit foxes were found to use up to 39 dens within a denning range of 320 to 482 acres (129.5 to 195 hectares) (Morrell 1972). An average den density of one den per 69 to 92 acres (27.9 to 37.2 hectares) was reported by O'Farrell (1984) in the southern San Joaquin Valley.

Non-natal Dens are used by San Joaquin kit foxes for temperature regulation, shelter from adverse environmental conditions, and escape from predators. Kit foxes excavate their own dens, use those constructed by other animals, and use human-made structures (culverts, abandoned pipelines, and banks in sumps or roadbeds). Kit foxes often change dens and may use many dens throughout the year; however, evidence that a den is being used by kit foxes may be absent. San Joaquin kit foxes have multiple dens within their home range and individual animals have been reported to use up to 70 different dens (Hall 1983). At the Naval Petroleum Reserve, individual kit foxes used an average of 11.8 dens per year (Koopman et al. 1998). Den switching by the San Joaquin kit fox may be a function of predator avoidance, local food availability, or external parasite infestations (e.g., fleas) in dens (Egoscue 1956).

The diet of the San Joaquin kit fox varies geographically, seasonally, and annually, based on temporal and spatial variation in abundance of potential prey. Known prey species of the kit fox include white-footed mice (*Peromyscus* species), various insects, California ground squirrels, kangaroo rats (*Dipodomys* species), San Joaquin antelope squirrels (*Ammospermophilus nelsoni*), black-tailed hares (*Lepus californicus*), and chukar (*Alectoris chukar*) (Jensen 1972; Archon 1992). Kit foxes also prey on desert cottontails (*Sylvilagus audubonii*), ground-nesting birds, and pocket mice (*Perognathus* species).

The diets and habitats selected by coyotes and San Joaquin kit foxes living in the same areas are often quite similar. Hence, the potential for resource competition between these species may be quite high when prey resources are scarce such as during droughts, which are quite common in semi-arid, Central California. Competition for resources between coyotes and kit foxes may result in kit fox mortalities. Coyote-related injuries accounted for 50-87 percent of the mortalities of radio collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the Naval Petroleum Reserve (Cypher and Scrivner 1992; Standley et al. 1992).

San Joaquin kit foxes are primarily nocturnal, although individuals are occasionally observed resting or playing (mostly pups) near their dens during the day (Grinnell et al. 1937). Kit foxes occupy home ranges that vary in size from 1.7 to 4.5 square miles (2.7 to 7.2 square kilometers) (White and Ralls 1993). These home ranges are typically occupied by a mated pair of kit foxes and their current litter of pups (White and Ralls 1993, Spiegel 1996; White and Garrott 1997). This social unit can include other adults, usually offspring from previous litters (Koopman et al. 2000), but individuals often move independently within their home range (Cypher 2000). Ralls et al. (2001) found that foxes sometimes share dens with foxes from other groups; many of these cases involved unpaired individuals and appeared to be unsuccessful attempts at pair formation. Average distances traveled each night range from 5.8 to 9.1 miles (9.3 to 14.6 kilometers) and are greatest during the breeding season (Cypher 2000).

Kit foxes maintain core home range areas that are exclusive to mated pairs and their offspring. This territorial spacing behavior eventually limits the number of foxes that can inhabit an area owing to shortages of available space and per capita prey. Hence, as habitat is fragmented or destroyed, the carrying capacity of an area is reduced and a larger proportion of the population is forced to disperse. Increased dispersal generally leads to lower survival rates and, in turn, decreased abundance because greater than 65 percent of dispersing juvenile foxes dies within 10 days of leaving their natal range (Koopman et al. 2000).

Estimates of fox density vary greatly throughout its range, and have been reported as high as 3.11 per square mile (1.94 per square kilometer) in optimal habitats in good years (Service 1998). At the Elk Hills in Kern County, density estimates varied from 1.86 animals per square mile (1.16 per square kilometer) in the early 1980s to 0.03 animals per square mile (0.02 per square kilometer) in 1991 (Service 1998). Kit fox home ranges vary in size from approximately 1 to 12 square miles (1.6 to 19.3 square kilometers) (Spiegel et al. 1996; Service 1998). Knapp (1978) estimated that a home range in agricultural areas is approximately 1.0 square mile (1.6 square kilometers). Individual home ranges overlap considerably, at least outside the core activity areas (Morrell 1972; Spiegel et al. 1996b).

Mean annual survival rates reported for adult San Joaquin kit foxes include 0.44 at the Naval Petroleum Reserve (Cypher et al. 2000), 0.53 at Camp Roberts (Standley et al. 1992), 0.56 at the Lokern area (Spiegel and Disney 1996), and 0.60 on the Carrizo Plain (Ralls and White 1995). However, survival rates widely vary among years (Spiegel and Disney 1996; Cypher et al. 2000). Mean survival rates for juvenile San Joaquin kit foxes are lower than rates for adults. The survival rate to 1 year-of-age was 0.14 at the Naval Petroleum Reserve (Cypher et al. 2000), 0.20 at Camp Roberts (Standley et al. 1992), and 0.21 on the Carrizo Plain (Ralls and White 1995). For both adults and juveniles, survival rates of males and females are similar. San Joaquin kit foxes may live 10 years in captivity (McGrew 1979) and 8 years in the wild (Berry et al. 1987), but most kit foxes do not live past 2-3 years of age.

The status (i.e., distribution, abundance) of the kit fox has decreased since its listing in 1967. This trend is reasonably certain to continue into the foreseeable future unless measures to protect, sustain, and restore suitable habitats, and alleviate other threats to their survival and recovery, are implemented. Threats that are seriously affecting kit foxes are described in further detail in the following sections.

<u>Loss of Habitat</u>

Less than 20 percent of the habitat within the historical range of the kit fox remained when the animal was listed as federally-endangered in 1967, and there has been a substantial net loss of habitat since that time. Historically, San Joaquin kit foxes occurred throughout California's Central Valley and adjacent foothills. Extensive land conversions in the Central Valley began as early as the mid-1800s with the Arkansas Reclamation Act. By the 1930's, the range of the kit fox had been reduced to the southern and western parts of the San Joaquin Valley (Grinnell et al. 1937). The primary factor contributing to this restricted distribution was the conversion of native habitat to irrigated cropland, industrial uses (e.g., hydrocarbon extraction), and urbanization (Laughrin 1970; Jensen 1972; Morrell 1972, 1975). Approximately one-half of the natural communities in the San Joaquin Valley were tilled or developed by 1958 (Service 1980).

This rate of loss accelerated following the completion of the Central Valley Project and the State Water Project, which diverted and imported new water supplies for irrigated agriculture (Service 1995a). Approximately 1.97 million acres (0.79 million hectares) of habitat, or about 66,000 acres (26,709 hectares) per year, were converted to other land uses in the San Joaquin region between 1950 and 1980 (Cowardin et al. 1979). The counties specifically noted as having the highest wild land conversion rates included Kern, Tulare, Kings and Fresno, all of which are occupied by the kit fox. From 1959 to 1969 alone, an estimated 34 percent of natural lands were lost within the then-known kit fox range (Laughrin 1970).

By 1979, only approximately 370,000 acres (149,734 hectares) of non-developed land remained in the approximately 8.5 million-acre (3.4 million-hectare) San Joaquin Valley floor (Williams 1985; Service 1980). Data from the California Department of Fish and Game (1985) and Service file information from between 1977 and 1988 indicates that essential habitat for the blunt-nosed leopard lizard (*Gambelia silus*), a species that occupies habitat that is also suitable for kit foxes, declined from 311,680 acres (126,133 hectares) to 63,060 acres (25,520 hectares). This represented a loss of approximately 80 percent and an average of approximately 22,000 acres (8903 hectares) per year (Biological Opinion for the Interim Water Contract Renewal, Service file 1-1-00-F-0056, February 29, 2000). Virtually all of the documented loss of essential blunt-nosed leopard lizard habitat was the result of conversion to irrigated agriculture.

During 1990 to 1996, a gross total of approximately 71,500 acres (28,935 hectares) of habitat were converted to farmland in 30 counties (total area 23.1 million acres [9.3 million hectares]) within the Conservation Program Focus area of the Central Valley Project. This figure includes 42,520 acres (17,207 hectares) of grazing land and 28,854 acres (11,677 hectares) of "other" land, which is predominantly comprised of native habitat. During this same time period, approximately 101,700 acres (41,157 hectares) were converted to urban land use within the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998). This figure includes 49,705 acres (20,115 hectares) of farmland, 20,476 acres (8286 hectares) of grazing land, and 31,366 acres (12,693 hectares) of "other" land, which is predominantly comprised of native habitat. Because these assessments included a substantial portion of the Central Valley and the adjacent foothills, they provide the best scientific and commercial information currently available regarding the patterns and trends of land conversion within the kit fox's geographic range. More than 1 million acres (0.4 million hectares) of suitable habitat for kit foxes have been converted to agricultural, municipal, or industrial uses since the listing of the kit fox. In contrast, less than 500,000 acres (202,343 hectares) have been preserved or are subject to community-level conservation efforts designed, at least in part, to further the conservation of the kit fox (Service 1998).

Land conversions contribute to declines in kit fox abundance through direct and indirect mortalities, displacement, reduction of prey populations and denning sites, changes in the distribution and abundance of larger canids that compete with kit foxes for resources, and reductions in carrying capacity. Kit foxes may be buried in their dens during land conversion activities (C. Van Horn, Endangered Species Recovery Program, Bakersfield, personal communication to S. Jones, Fish and Wildlife Service, Sacramento, California, 2000), or permanently displaced from areas where structures are erected or the land is intensively irrigated (Jensen 1972; Morrell 1975). Furthermore, even moderate fragmentation or loss of habitat may significantly impact the abundance and distribution of kit foxes. Capture rates of kit foxes at the Naval Petroleum Reserve in Elk Hills were negatively associated with the extent of oil-field development after 1987 (Warrick and Cypher 1999). Likewise, the California Energy Commission found that the relative abundance of kit foxes was lower in oil-developed habitat than in nearby undeveloped habitat on the Lokern (Spiegel 1996). Researchers from both studies inferred that the most significant effect of oil development was the lowered carrying capacity for populations of both foxes and their prey species attributed to the changes in habitat characteristics or the loss and fragmentation of habitat (Spiegel 1996; Warrick and Cypher 1999).

Dens are essential for the survival and reproduction of kit foxes that use them year-round for shelter and escape, and in the spring for rearing young. Hence, kit foxes generally have dozens of dens scattered throughout their territories. However, land conversion reduces the number of typical earthen dens available to kit foxes. For example, the average density of typical, earthen kit fox dens at the Naval Hills Petroleum Reserve was negatively correlated with the intensity of petroleum development (Zoellick et al.1987), and almost 20 percent of the dens in developed areas were found to be in well casings, culverts, abandoned pipelines, oil well cellars, or in the banks of sumps or roads (Service 1983). These results are important because the California Energy Commission found that, even though kit foxes frequently used pipes and culverts as dens in oil-developed areas of western Kern County, only earthen dens were used to birth and wean pups (Spiegel 1996). Similarly, kit foxes in Bakersfield use atypical dens, but have only been found to rear pups in earthen dens (Patrick Kelly, Endangered Species Recovery Program, Fresno, California, personal communication to P. White, Service, Sacramento, California, April 6, 2000). Hence, the fragmentation of habitat and destruction of earthen dens could adversely affect the reproductive success of kit foxes. Furthermore, the destruction of earthen dens may also affect kit fox survival by reducing the number and distribution of escape refuges from predators.

Land conversions and associated human activities can lead to widespread changes in the availability and composition of mammalian prey for kit foxes. For example, oil field disturbances in western Kern County have resulted in shifts in the small mammal community from the primarily granivorous species that are the staple prey of kit foxes (Spiegel 1996), to species adapted to early successional stages and disturbed areas (e.g., California ground squirrels)(Spiegel 1996). Because more than 70 percent of the diets of kit foxes usually consist of abundant rabbits (*Lepus*, *Sylvilagus*) and rodents (e.g., *Dipodomys* species), and kit foxes often continue to feed on their staple prey during ephemeral periods of prey scarcity, such changes in the availability and selection of foraging sites by kit foxes could influence their reproductive rates, which are strongly influenced by food supply and decrease during periods of prey scarcity (White and Garrott 1997, 1999).

Extensive habitat destruction and fragmentation have contributed to smaller, more-isolated populations of kit foxes. Small populations have a higher probability of extinction than larger populations because their low abundance renders them susceptible to stochastic (i.e., random) events such as high variability in age and sex ratios, and catastrophes such as floods, droughts, or disease epidemics (Lande 1988; Frankham and Ralls 1998; Saccheri et al. 1998). Similarly, isolated populations are more susceptible to extirpation (localized extinction) by accidental or natural catastrophes because their recolonization has been hampered. These chance events can adversely affect small, isolated populations with devastating results. Extirpation can even occur when the members of a small population are healthy, because whether the population increases or decreases in size is less dependent on the age-specific probabilities of survival and reproduction than on raw chance (sampling probabilities). Owing to the probabilistic nature of extinction, many small populations will eventually lose out and go extinct when faced with these stochastic risks (Caughley and Gunn 1995).

Oil fields in the southern half of the San Joaquin Valley also continue to be an area of expansion and development activity. This expansion is reasonably certain to increase in the near future owing to market-driven increases in the price of oil. The cumulative and long-term effects of oil extraction activities on kit fox populations are not fully known, but recent studies indicate that moderate- to high-density oil fields may contribute to a decrease in carrying capacity for kit foxes attributed to habitat loss or changes in habitat characteristics (Spiegel 1996; Warrick and Cypher 1999). There are no limiting factors or regulations that are likely to retard the development of additional oil fields. Hence, it is reasonably certain that development will continue to destroy and fragment kit fox habitat into the foreseeable future.

Competitive Interactions with Other Canids

Several species prey upon San Joaquin kit foxes. Predators (such as coyotes, bobcats [*Lynx rufus*], non-native red foxes [*Vulpes vulpes*], badgers, and golden eagles [*Aquila chrysaetos*]) will kill kit foxes. Badgers, coyotes, and red foxes may also compete with kit foxes for den sites (Service 1998). The diets and habitats selected by coyotes and kit foxes living in the same areas are often quite similar (Cypher and Spencer 1998). Hence, the potential for resource competition between these species may be quite high when prey resources are scarce such as during droughts, which are quite common in semi-arid, central California. Land conversions and associated human activities have led to changes in the distribution and abundance of coyotes, which compete with kit foxes for resources.

Coyotes occur in most areas with abundant populations of San Joaquin kit foxes and, during the past few decades, coyote abundance has increased in many areas due to a decrease in ranching operations, favorable landscape changes, and reduced control efforts (Orloff et al. 1986; Cypher and Scrivner 1992; White and Ralls 1993; White et al. 1995). Coyotes may attempt to lessen resource competition with kit foxes by killing them. In past studies, coyote-related injuries accounted for 50-87 percent of the mortalities of radio collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the Naval Petroleum Reserves (Cypher and Scrivner 1992; Standley et al. 1992; Ralls and White 1995; Spiegel 1996). Coyote-related deaths of adult foxes appear to be largely additive (i.e., in addition to deaths caused by other mortality factors such as disease and starvation) rather than compensatory (i.e., tending to replace deaths due to other mortality factors; White and Garrott 1997). Hence, the survival rates of adult foxes decrease significantly as the proportion of mortalities caused by coyotes increase (Cypher and Spencer 1998; White and Garrott 1997), and increases in coyote abundance may contribute to significant declines in kit fox abundance (Cypher and Scrivner 1992; Ralls and White 1995; White et al. 1996). There is some evidence that the proportion of juvenile foxes killed by coyotes increases as fox density increases (White and Garrott 1999). This density-dependent relationship would provide a feedback mechanism that reduces the amplitude of kit fox population dynamics and keeps foxes at lower densities than they might otherwise attain. In other words, coyote-related mortalities may dampen or prevent fox population growth, and accentuate, hasten, or prolong population declines.

Land-use changes also contributed to the expansion of non-native red foxes into areas inhabited by the San Joaquin kit fox. Historically, the geographic range of the red fox did not overlap with that of the kit fox. By the 1970's, however, introduced and escaped red foxes established breeding populations in many areas inhabited by San Joaquin kit foxes (Lewis et al. 1993). The larger and more aggressive red foxes are known to kill kit foxes (Ralls and White 1995), and could displace them, as has been observed in the arctic when red foxes expanded into the ranges of smaller arctic foxes (*Alopex lagopus*) (Hersteinsson and Macdonald 1982). The increased abundance and distribution of nonnative red foxes will also likely adversely affect the status of kit foxes because they are closer morphologically and taxonomically related, and would likely have higher dietary overlap than coyotes; potentially resulting in more intense competition for resources. Two documented deaths of kit foxes due to red foxes have been reported (Ralls and White 1995), and red foxes appear to be displacing kit foxes in the northwestern part of their range (Lewis et al. 1993). At Camp Roberts, red foxes have usurped several dens that were used by kit foxes during previous years (California Army National Guard, Camp Roberts Environmental Office, unpublished data). In fact, opportunistic observations of red foxes in the cantonment area of Camp Roberts have increased 5-fold since 1993, and no kit foxes have been sighted or captured in this area since October 1997. Also, a telemetry study of sympatric red foxes and kit foxes in the Lost Hills area has detected spatial segregation between these species, suggesting that kit foxes may avoid or be excluded from red fox-inhabited areas (Patrick Kelly, personal communication to P.J. White, April 6, 2000). Such avoidance would limit the resources available to local populations of kit foxes and possibly result in decreased fox abundance and distribution.

Disease

Wildlife diseases do not appear to be a primary mortality factor that limits kit fox populations throughout their range (McCue and O'Farrell 1988; Standley and McCue 1992). However, central California has a high incidence of wildlife rabies cases (Schultz and Barrett 1991), and high seroprevalences of canine distemper virus and canine parvovirus indicate that kit fox populations have been exposed to these diseases (McCue and O'Farrell 1988; Standley and McCue 1992). Hence, disease outbreaks could potentially cause substantial mortality or contribute to reduced fertility in seropositive (presence of a certain antibody in a blood sample) females, as was noted in the closely-related swift fox (*Vulpes velox*).

For example, there are some indications that the rabies virus may have contributed to a catastrophic decrease in kit fox abundance at Camp Roberts, San Luis Obispo County, California, during the early 1990's. San Luis Obispo County had the highest incidence of wildlife rabies cases in California from 1989 to 1991, and striped skunks (*Mephitis mephitis*) were the primary vector (Barrett 1990; Schultz and Barrett 1991; Reilly and Mangiamele 1992). A rabid skunk was trapped at Camp Roberts during 1989 and two foxes were found dead due to rabies in 1990 (Standley et al. 1992). Captures of kit foxes during annual live trapping sessions at Camp Roberts decreased from 103 to 20 individuals from 1988 to 1991. Captures of kit foxes were positively correlated with captures of skunks from 1988 to 1997, suggesting that some factor(s) such as the rabies virus was contributing to concurrent decreases in the abundances of these species. Also, captures of kit foxes at Camp Roberts were negatively correlated with the proportion of rabid skunks trapped by County Public Health Department personnel two years previously. These data suggest that a rabies outbreak may have occurred in the skunk population and spread to the fox population. A similar time lag in disease transmission and subsequent population reductions was observed in Ontario, Canada, although in this instance the transmission was from red foxes to striped skunks (MacDonald and Voigt 1985).

<u>Pesticides and Rodenticides</u>

Pesticides and rodenticides pose a threat to kit foxes through direct or secondary poisoning. Kit foxes may be killed if they ingest rodenticide in a bait application, or if they eat a rodent that has consumed the bait. Even sublethal doses of rodenticides may lead to the death of these animals by impairing their ability to escape predators or find food. Pesticides and rodenticides may also indirectly affect the survival of kit foxes by reducing the abundance of their staple prey species.

For example, the California ground squirrel, the staple prey item in the northern portion of the kit fox range, was thought to have been eliminated from Contra Costa County in 1975, after extensive rodent eradication programs. Field observations indicated that the long-term use of ground squirrel poisons in this county severely reduced kit fox abundance through secondary poisoning and the suppression of populations of its staple prey (Orloff et al. 1986).

Kit foxes occupying habitats adjacent to agricultural lands are also likely to come into contact with insecticides applied to crops and subsequently discharged through runoff or aerial drift. Kit foxes could be affected through direct contact with chemical sprays and treated soils, or through consumption of contaminated prey. Data from the California Department of Pesticide Regulation indicate that acephate, aldicarb, azinphos methyl, bendiocarb, carbofuran, chlorpyrifos, endosulfan, s-fenvalerate, naled, parathion, permethrin, phorate, and trifluralin are used within one mile (1.6 kilometer) of kit fox habitat. A wide variety of crops (alfalfa, almonds, apples, apricots, asparagus, avocados, barley, beans, beets, bok choy, broccoli, cantaloupe, carrots, cauliflower, celery, cherries, chestnuts, chicory, Chinese cabbage, Chinese greens, Chinese radish, collards, corn, cotton, cucumbers, eggplants, endive, figs, garlic, grapefruit, grapes, hay, kale, kiwi fruit, kohlrabi, leeks, lemons, lettuce, melons, mustard, nectarines, oats, okra, olives, onions, oranges, parsley, parsnips, peaches, peanuts, pears, peas, pecans, peppers, persimmons, pimentos, pistachios, plums, pomegranates, potatoes, prunes, pumpkins, quinces, radishes, raspberries, rice, safflower, sorghum, spinach, squash, strawberries, sugar beets, sweet potatoes, Swiss chard, tomatoes, walnuts, watermelons, and wheat), as well as buildings, Christmas tree plantations, commercial/industrial areas, greenhouses, nurseries, landscape maintenance, ornamental turf, rangeland, rights of way, and uncultivated agricultural and non-agricultural land, occur in close proximity to San Joaquin kit fox habitat.

Efforts have been underway to reduce the risk of kit foxes coming into contact with rodenticides to kit foxes (Service 1993). The Federal government began controlling the use of rodenticides in 1972 with a ban of Compound 1080 on Federal lands pursuant to Executive Order. Above-ground application of strychnine within the geographic ranges of listed species was prohibited in 1988. A July 28, 1992, biological opinion regarding the Animal Damage Control (now known as Wildlife Services) Program by the U.S. Department of Agriculture found that this program was likely to jeopardize the continued existence of the kit fox due to the potential for rodent control activities to "take" the fox. As a result, several reasonable and prudent measures were implemented, including a ban on the use of M-44 devices, toxicants, and fumigants within the recognized occupied range of the kit fox. Zinc phosphide, a compound known to be minimally toxic to kit foxes, was the only chemical authorized for use by Wildlife Services within the occupied range of the kit fox (Service 1993).

Despite these efforts, the use of other pesticides and rodenticides still pose a significant threat to the kit fox, as evidenced by the death of two kit foxes at Camp Roberts in 1992 due to secondary poisoning from chlorophacinone applied as a rodenticide, (Berry et al. 1992; Standley et al. 1992). Detectable residues of the anticoagulant rodenticides chlorophacinone, brodifacoum, and bromadiolone were found in the livers of three kit foxes recovered in the City of Bakersfield in 1999 (California Department of Fish and Game 1999).

To date, no specific research has been conducted on the effects of different pesticide or rodent control programs on the kit fox (Service 1998). This lack of information is problematic because Williams (in litt., 1989) documented widespread pesticide use in known kit fox and Fresno kangaroo rat habitat adjoining agricultural lands in Madera County. In a separate report, Williams (in litt., 1989) documented another case of pesticide use near Raisin City in Fresno County, where treated grain was placed within an active Fresno kangaroo rat (*Dipodomys nitratoides exilis*) precinct. Also, farmers have been allowed to place bait on Bureau of Reclamation property to maximize the potential for killing rodents before they entered adjoining fields (Biological Opinion for the Interim Water Contract Renewal, Service file 1-1-00-F-0056, February 29, 2000).

A September 22, 1993, biological opinion issued by the Service to the U.S. Environmental Protection Agency regarding the regulation of pesticide use (31 registered chemicals) through administration of the Federal Insecticide, Fungicide, and Rodenticide Act found that use of the following chemicals would likely jeopardize the continued existence of the kit fox: (1) aluminum and magnesium phosphide fumigants; (2) chlorophacinone anticoagulants; (3) diphacinone anticoagulants; (4) pival anticoagulants; (5) potassium nitrate and sodium nitrate gas cartridges; and (6) sodium cyanide capsules (Service 1993). Reasonable and prudent alternatives to avoid jeopardy included restricting the use of aluminum/magnesium phosphide, potassium/sodium nitrate within the geographic range of the kit fox to qualified individuals, and prohibiting the use of chlorophacinone, diphacinone, pival, and sodium cyanide within the geographic range of the kit fox, with certain exceptions (e.g., agricultural areas that are greater than 1 mile [1.6 kilometers] from any kit fox habitat) (Service 1999).

Endangered Species Act Section 9 Violations and Noncompliance with the Terms and Conditions of Existing Biological Opinions

The intentional or unintentional destruction of habitat occupied by the San Joaquin kit fox is an issue of serious concern. Section 9 of the Act prohibits the "take" (e.g., harm, harass, pursue, injure, kill) of federally-listed wildlife species. "Harm" is further defined to include habitat modification or degradation that kills or injures wildlife by impairing essential behavioral patterns including breeding, feeding, or sheltering. Congress established two provisions (under sections 7 and 10 of the Act) that allow for the incidental take of listed wildlife species by Federal agencies, non-Federal government agencies, and private parties. Incidental take is defined as take that is "...incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." If no permit is obtained for the incidental take of listed species, the individuals or entities responsible for these actions could be liable under section 9 of the Act if any unauthorized take occurs. There are numerous examples of potential section 9 violations and possible non-compliance with the terms and conditions of existing biological opinions.

Risk of Chance Extinction Due to Small Population Size, Isolation, and High Natural Fluctuations in Abundance

Historically, kit foxes may have existed in a metapopulation (a group of spatially separated populations of the same species which interact at some level) structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). Today's kit fox populations exist in an environment drastically different from the historic one, however, and extensive habitat fragmentation will result in geographic isolation, smaller population sizes, and reduced genetic exchange among populations; all of which increase the vulnerability of kit fox populations to extirpation. Populations of kit foxes are extremely susceptible to the risks associated with small population size and isolation because they are characterized by marked instability in population density. For example, the relative abundance of kit foxes at the Naval Petroleum Reserves, California, decreased 10-fold from 1981 to 1983, increased 7-fold from 1991 to 1994, and then decreased 2-fold in 1995 (Cypher and Scrivner 1992; Cypher and Spencer 1998).

Many kit fox populations are at risk of chance extinction due to small population size and isolation. This risk has been prominently illustrated during recent, drastic declines in the populations of kit foxes at Camp Roberts and Fort Hunter Liggett. Captures of kit foxes during annual live trapping sessions at Camp Roberts decreased from 103 to 20 individuals between 1988 and 1991. This decline continued through 1997 when only three kit foxes were captured (White et al. 2000). A similar decrease in kit fox abundance occurred at nearby Fort Hunter

Liggett, and only two kit foxes have been observed on this installation since 1995 (L. Clark, Wildlife Biologist, Fort Hunter Liggett, personal communication to P.J. White, February 15, 2000). It is unlikely that the current low abundances of kit foxes at Camp Roberts and Fort Hunter Liggett will increase substantially in the near future due to the limited potential for recruitment. The chance of substantial immigration is low because the nearest core population on the Carrizo Plain is distant (greater than 16 miles [25.7 kilometers]) and separated from these installations by barriers to kit fox movement such as roads, developments, and irrigated agricultural areas. Also, there is a relatively high abundance of sympatric predators and competitors on these installations that contribute to low survival rates for kit foxes and, as a result, may limit population growth (White et al. 2000). Hence, these populations may be on the verge of extinction.

The destruction and fragmentation of habitat could also eventually lead to reduced genetic variation in populations of kit foxes that are small and geographically isolated. Historically, kit foxes likely existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). Preliminary genetic assessments indicate that historic gene flow among populations was quite high, with effective dispersal rates of at least one to four dispersers per generation (M. Schwartz, University of Montana, Missoula, Montana, personal communication to P.J. White, March 23, 2000). This level of genetic dispersal should allow for local adaptation while preventing the loss of any rare alleles. Based on these results, it is likely that northern populations of kit foxes were once panmictic (i.e., randomly mating in a genetic sense), or nearly so, with southern populations. In other words, there were no major barriers to dispersal among populations.

Current levels of gene flow appear to be adequate, however, extensive habitat loss and fragmentation continues to form more or less geographically distinct populations of foxes, which could potentially reduce genetic exchange among them. An increase in inbreeding and the loss of genetic variation could increase the extinction risk for small, isolated populations of kit foxes by interacting with demography to reduce fecundity, juvenile survival, and lifespan (Lande 1988; Frankham and Ralls 1998; Saccheri et al. 1998).

An area of particular concern is Santa Nella in western Merced County where pending development plans threaten to eliminate the little suitable habitat that remains and provides a dispersal corridor for kit foxes between the northern and southern portions of their range. Preliminary estimates of expected heterozygosity (the fraction of individuals in a population that have different alleles at a locus on homologous chromosomes) from foxes in this area indicate that this population already may have reduced genetic variation. Other populations that may be showing the initial signs of genetic isolation are those in the Lost Hills area and the Salinas-Pajaro River watershed (i.e., Camp Roberts and Fort Hunter Liggett). Preliminary estimates of the mean number of alleles per locus from foxes in these populations indicate that allelic diversity is lower than expected. Although these results may, in part, be due to the small number of foxes sampled in these areas, they may also be indicative of an increase in the amount of inbreeding due to further population subdivision (M. Schwartz, personal communication to P. J.

White, March 23, 2000). Further sampling and analyses are necessary to adequately assess the effects of these potential genetic bottlenecks.

Arid systems are characterized by unpredictable fluctuations in precipitation, which lead to high frequency, high amplitude fluctuations in the abundance of mammalian prey for kit foxes (Goldingay et al. 1997; White and Garrott 1999). Because the reproductive and neonatal (newborn) survival rates of kit foxes are strongly depressed at low prey densities (White and Ralls 1993; White and Garrott 1997, 1999), periods of prey scarcity due to drought or excessive rain events can contribute to population crashes and marked instability in the abundance and distribution of kit foxes (White and Garrott 1999). In other words, unpredictable, short-term fluctuations in precipitation and, in turn, prey abundance can generate frequent, rapid decreases in kit fox density that increase the extinction risk for small, isolated populations.

The primary goal of the recovery strategy for kit foxes identified in the Recovery Plan for Upland Species of the San Joaquin Valley, California (Service 1998) is to establish a complex of interconnected core and satellite populations throughout the species' range. The long-term viability of each of these core and satellite populations depends partly upon periodic dispersal and genetic flow between them. Therefore, kit fox movement corridors between these populations must be preserved and maintained. In the northern range, from the Ciervo Panoche region in Fresno County northward, kit fox populations are small and isolated, and have exhibited significant decline. The core populations are the Ciervo Panoche area, the Carrizo Plain area, and the western Kern County population. Satellite populations are found in the urban Bakersfield area, Porterville/Lake Success area, Creighton Ranch/Pixley Wildlife Refuge, Allensworth Ecological Reserve, Semitropic/Kern National Wildlife Refuge (NWR), Antelope Plain, eastern Kern grasslands, Pleasant Valley, western Madera County, Santa Nella, Kesterson NWR, and Contra Costa County. Major corridors connecting these population areas are on the east and west side of the San Joaquin Valley, including the Millerton Lake area of Fresno County, around the bottom of the Valley, and cross-valley corridors in Kern, Fresno, and Merced counties.

From 1991 to 2000, the Service authorized incidental take for 13 projects in Alameda, Contra Costa, San Joaquin, and Stanislaus Counties that have resulted in the loss or degradation of approximately 2,644 acres (1,070 hectares) of San Joaquin kit fox habitat (Service 2001b). Compensation measures for these projects protected or will protect 3,016 acres (1,221 hectares) of kit fox habitat within this area. However, much of these conservation measures are in the form of conservation easements, and for the most part, the lands are not actively managed for kit fox. The Service also recently issued an incidental permit for projects occurring in San Joaquin County as identified in the San Joaquin Multi-species Open Space and Conservation Plan. Since the issuance of this section 10(a)(1)(B) permit in July of 2001, three projects within the kit fox corridor have been or are in the process of being permitted. These projects will impact approximately 204 acres (83 hectares) of kit fox habitat. The San Joaquin County Council of Governments will purchase lands at a ratio of 3:1 for natural lands and 1:1 for disturbed lands to mitigate for these impacts. In 2002, the McDonald Kit Fox Preserve was acquired in southwest

San Joaquin County to compensate for impacts of current and future actions that will affect the kit fox (San Joaquin County 2003).

Although there have been sightings of kit fox in the northern range through the years by qualified biologists, population studies in this area have been limited. In 1982 and 1983, a family of kit foxes was radio collared and monitored near Bethany Reservoir (Hall 1983). From 1985 to 1989, kit fox surveys in the Kellogg Creek watershed found a total of 114 potential and possibly active dens, most of which were associated with ground squirrel colonies (Jones & Stokes Associates 1989).

The small size of the population and its isolation from other established populations make this northern most population vulnerable to extinction due to predation and competition from coyotes and red foxes, inbreeding, catastrophic events, and disease epidemics (White et al. 2000). Genetic studies conducted by Schwartz et al. (2000) found that individuals in the Los Banos population near San Luis Reservoir only breed with animals in the northern population in Alameda and Contra Costa counties. Thus, projects in Alameda and Contra Costa counties that significantly reduce travel corridors and population size could potentially impact the Los Banos kit fox population. The long term viability of both populations depends, at least in part, on periodic immigration and gene flow from between the populations.

Habitat in the northern range is highly fragmented by highways, canals, and development. Interstate 580 runs southeast to northwest as it splits from Interstate 5, and turns west through the Altamont Pass area; thus it impedes both north-south and west-east movement of San Joaquin kit foxes. Although the canal system facilitates north-south migration along its length, it also impedes lateral east-west kit fox travel. Recent development proposals, including those described above, will further impede the movement of kit fox and isolate the northern population from more southern populations. These and other developments are slowly diminishing the last remaining kit fox habitat, and development pressures are expected to increase in the future (see Cumulative Effects section of this biological opinion). The protection of the remaining travel corridor, including grasslands west of Interstate 580, and lands between the California aqueduct and the Delta Mendota Canal, is vital to the survival of this population.

San Joaquin kit foxes have been reported in the vicinity of Santa Clara County in habitat similar to that which occurs in and immediately adjacent to the action area. Road kill San Joaquin kit foxes were recovered approximately 2.5 miles (4.02 kilometers) southwest of the action area in 1991 (California Department of Fish and Game 2005). Kit fox was also reported near Bell Station and Pacheco Reservoir in 2002, approximately 6.5 miles (10.46 kilometers) southeast of the action area (Bill Johnson, Wildlife Biologist, California Department of Fish and Game, personal communication to J. Cleckler, Service, Sacramento, California, September 27, 2005). Individuals have been recorded to have moved as much as 9 miles (14.5 kilometers) in a single night. It is unknown whether San Joaquin kit fox are currently breeding in the vicinity but the action area is within the range of this species as mapped by the California Department of Fish and Game and the best available survey information suggests that kit fox are dispersing through the area. The general vicinity is occupied by other species, such as red-tailed hawk (*Buteo* *jamaicensis*), western burrowing owl (*Speotyto cunicularia hypugea*), American badger, and coyote, that rely on a similar prey base and are often associated with San Joaquin kit fox distribution (Caltrans 2000; Caltrans 2001; J. Cleckler personal observation). Therefore, the Service believes that the San Joaquin kit fox is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as the nearby observations of this listed species. Formal consultation for the San Joaquin kit fox was also completed for the Proposed State Route 152/State Route 156 Improvement Project (Caltrans EA 04230-0A830; Service File #1-1-06-F-0018), which is located approximately 0.5 miles (8.0 kilometers) east of the proposed State Route 152 project.

California Tiger Salamander

The final rule listing the California tiger salamander as a threatened species was published on August 4, 2004 (Service 2004a).

The California tiger salamander is endemic to California and historically inhabited the low-elevation grassland and oak savanna plant communities of the Central Valley, adjacent foothills, and inner coast ranges (Jennings and Hayes 1994; Storer 1925; Shaffer et al. 1993). The species has been recorded from near sea level to approximately 3,900 feet (1,189 meters) in the coast ranges and to approximately 1,600 feet (488 meters) in the Sierra Nevada foothills (Shaffer et al. 2004). Along the Coast Ranges, the species occurred from the Santa Rosa area of Sonoma County, south to the vicinity of Buellton in Santa Barbara County. The historic distribution in the Central Valley and surrounding foothills included northern Yolo County southward to northwestern Kern County and northern Tulare County. Three distinct California tiger salamander populations are recognized and correspond to Santa Maria area within Santa Barbara County, the Santa Rosa Plain in Sonoma County, and vernal pool/grassland habitats throughout the Central Valley.

The California tiger salamander is a large, stocky, terrestrial salamander with a broad, rounded snout. Recorded adult measurements have been as much as 8.2 inches (20.8 centimeters) long (Petranka 1998; Stebbins 2003). Tiger salamanders exhibit sexual dimorphism (differences in body appearance based on gender) with males tending to be larger than females. Tiger salamander coloration generally consists of random white or yellowish markings against a black body. The markings on adults California tiger salamanders tend to be more concentrated on the lateral sides of the body, whereas other tiger salamander species tend to have brighter yellow spotting that is heaviest on the dorsal surface.

The tiger salamander has an obligate biphasic life cycle (Shaffer et al. 2004). Although the larvae develop in the vernal pools and ponds in which they were born, tiger salamanders are otherwise terrestrial and spend most of their post-metamorphic lives in widely dispersed underground retreats (Shaffer et al. 2004; Trenham et al. 2001). Because they spend most of their lives underground, tiger salamanders are rarely encountered even in areas where salamanders are abundant. Subadult and adult tiger salamanders typically spend the dry summer and fall months in the burrows of small mammals, such as California ground squirrels and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925; Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998a). Although ground squirrels have been known to eat tiger salamanders, the relationship with their burrowing hosts is primarily commensal (an association that benefits one member while the other is not affected) (Loredo et al. 1996; Semonsen 1998).

Tiger salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Burrows often harbor camel crickets and other invertebrates that provide likely prey for tiger salamanders. Underground refugia also provide protection from the sun and wind associated with the dry California climate that can cause excessive drying of amphibian skin. Although California tiger salamanders are members of a family of "burrowing" salamanders, they are not known to create their own burrows. This may be due to the hardness of soils in the California ecosystems in which they are found. Tiger salamanders depend on persistent small mammal activity to create, maintain, and sustain sufficient underground refugia for the species. Burrows are short lived without continued small mammal activity and typically collapse within approximately 18 months (Loredo et al. 1996).

Upland burrows inhabited by tiger salamanders have often been referred to as aestivation sites. However, "aestivation" implies a state of inactivity, while most evidence suggests that tiger salamanders remain active in their underground dwellings. A recent study has found that tiger salamanders move, feed, and remain active in their burrows (Van Hattem 2004). Because tiger salamanders arrive at breeding ponds in good condition and are heavier when entering the pond than when leaving, researchers have long inferred that tiger salamanders are feeding while underground. Recent direct observations have confirmed this (Trenham 2001; Van Hattem 2004). Thus, "upland habitat" is a more accurate description of the terrestrial areas used by tiger salamanders.

Tiger salamanders typically emerge from their underground refugia at night during the fall or winter rainy season (November-May) to migrate to their breeding ponds (Stebbins 1985, 1989; Shaffer et al. 1993; Trenham et al. 2000). The breeding period is closely associated with the rainfall patterns in any given year with less adults migrating and breeding in drought years (Loredo and Van Vuren 1996; Trenham et al. 2000). Male salamander are typically first to arrive and generally remain in the ponds longer than females. Results from a 7-year study in Monterey County suggested that males remained in the breeding ponds for an average of 44.7 days while females remained for an average of only 11.8 days (Trenham et al. 2000). Historically, breeding ponds were likely limited to vernal pools, but now include livestock stockponds. Ideal breeding ponds are typically fishless, and seasonal or semi-permanent (Barry and Shaffer 1994; Petranka 1998).

While in the ponds, adult salamanders mate and then the females lay their eggs in the water (Twitty 1941; Shaffer et al. 1993; Petranka 1998). Egg laying typically reaches a peak in January (Loredo and Van Vuren 1996; Trenham et al. 2000). Females attach their eggs singly, or in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris (Storer 1925;

Twitty 1941). Eggs are often attached to objects, such as rocks and boards in ponds with no or limited vegetation (Jennings and Hayes 1994). Clutch sizes from a Monterey County study had an averaged of 814 eggs (Trenham et al. 2000). Seasonal pools may not exhibit sufficient depth, persistence, or other necessary parameters for adult breeding during times of drought (Barry and Shaffer 1994). After breeding and egg laying is complete, adults leave the pool and return to their upland refugia (Loredo et al. 1996; Trenham 1998a). Adult salamanders often continue to emerge nightly for approximately the next two weeks to feed amongst their upland habitat (Shaffer et al. 1993).

Tiger salamander larvae typically hatch within 10 to 24 days after eggs are laid (Storer 1925). The peak emergence of these metamorphs is typically between mid-June to mid-July (Loredo and Van Vuren 1996; Trenham et al. 2000). The larvae are totally aquatic and range in length from approximately 0.45 to 0.56 inches (1.14 to 1.42 centimeters) (Petranka 1998). They have yellowish gray bodies, broad fat heads, large, feathery external gills, and broad dorsal fins that extend well up their back. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about six weeks after hatching, after which they switch to larger prey (J. Anderson 1968). Larger larvae have been known to consume the tadpoles of Pacific treefrogs (*Pseudacris regilla*), Western spadefoot toads (*Spea hammondii*), and California red-legged frogs (J. Anderson 1968; P. Anderson 1968; University of California 2005). Tiger salamander larvae are among the top aquatic predators in seasonal pool ecosystems. When not feeding, they often rest on the bottom in shallow water but are also found throughout the water column in deeper water. Young salamanders are wary and typically escape into vegetation at the bottom of the pool when approached by potential predators (Storer 1925).

The tiger salamander larval stage is typically completed in 3 to 6 months with most metamorphs entering upland habitat during the summer (Petranka 1998). In order to be successful, the aquatic phase of this species' life history must correspond with the persistence of its seasonal aquatic habitat. Most seasonal ponds and pools dry up completely during the summer. Amphibian larvae must grow to a critical minimum body size before they can metamorphose (change into a different physical form) to the terrestrial stage (Wilbur and Collins 1973).

Larval development and metamorphosis can vary and is often site-dependent. In one study, larvae collected near Stockton in the Central Valley during April varied between 1.88 to 2.32 inches (4.78 to 5.89 centimeters) in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left breeding pools 60 to 94 days after eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. Longer ponding duration typically results in larger larvae and metamorphosed juveniles that are more likely to survive and reproduce (Pechmann et al. 1989; Semlitsch et al. 1988; Morey 1998; Trenham 1998b). Larvae will perish if a breeding pond dries before metamorphosis is complete (P. Anderson 1968; Feaver 1971). Pechmann et al. (1988) found a strong positive correlation between ponding duration and total number of metamorphosing juveniles in five salamander species. In Madera County, Feaver (1971) found that only 11 of 30 sampled pools supported larval California tiger salamanders, and 5 of these dried before metamorphosis could occur. Therefore, out of the original 30 pools, only

6 (20 percent) provided suitable conditions for successful reproduction that year. Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch et al. 1988; Scott 1994; Morey 1998).

Following metamorphosis, juveniles leave their pools and enter upland habitat. This emigration can occur in both wet and dry conditions (Loredo and Van Vuren 1996; Loredo et al. 1996). Wet conditions are more favorable for upland travel but rare summer rain events seldom occur as metamorphosis is completed and ponds begin to dry. As a result, juveniles may be forced to leave their ponds on rainless nights. Under dry conditions, juveniles may be limited to seeking upland refugia in close proximity to their aquatic larval pool. These individuals often wait until the next winter's rains to move further into more suitable upland refugia. Although likely rare, larvae may over-summer in permanent ponds (University of California 2005). Juveniles remain active in their upland habitat, emerging from underground refugia during rainfall events to disperse or forage (Trenham and Shaffer 2005). Depending on location and other development factors, metamorphs will not return as adults to aquatic breeding habitat for 2 to 5 years (Loredo and Van Vuren 1996; Trenham et al. 2000).

Lifetime reproductive success for tiger salamander species is low. Results from one study suggest that the average female tiger salamander bred 1.4 times and produced 8.5 young per reproductive effort that survived to metamorphosis (Trenham et al.2000). This resulted in the output of roughly 11 metamorphic offspring over a breeding female's lifetime. The primary reason for low reproductive success may be that this relatively short-lived species requires two or more years to become sexually mature (Shaffer et al. 1993). Some individuals may not breed until they are four to six years old. While California tiger salamanders may survive for more than ten years, many breed only once, and in one study, less than 5 percent of marked juveniles survived to become breeding adults (Trenham 1998b). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events as well human-caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated pools can quickly extirpate a population.

Dispersal and migration movements made by tiger salamanders can be grouped into two main categories: (1) breeding migration; and (2) interpond dispersal. Breeding migration is the movement of salamanders to and from a pond from the surrounding upland habitat. After metamorphosis, juveniles move away from breeding ponds into the surrounding uplands, where they live continuously for several years. At a study in Monterey County, it was found that upon reaching sexual maturity, most individuals returned to their natal/ birth pond to breed, while 20 percent dispersed to other ponds (Trenham et al. 2001). After breeding, adult tiger salamanders return to upland habitats, where they may live for one or more years before attempting to breed again (Trenham et al. 2000).

Tiger salamanders are known to travel large distances between breeding ponds and their upland refugia. Generally it is difficult to establish the maximum distances traveled by any species, but tiger salamanders in Santa Barbara County have been recorded dispersing up to 1.3 miles (2.1 kilometers) from their breeding ponds (Sweet.1998). Tiger salamanders are also known to travel between breeding ponds. One study found that 20 to 25 percent of the individuals captured at one pond were recaptured later at other ponds approximately 1,900 and 2,200 feet (579 to 671 meters) away (Trenham et al. 2001). In addition to traveling long distances during juvenile dispersal and adult migration, tiger salamanders may reside in burrows far from their associated breeding ponds.

Although previously sited information indicates that tiger salamanders can travel long distances, they typically remain close to their associated breeding ponds. A trapping study conducted in Solano County during the winter of 2002-03 suggested that juveniles dispersed and used upland habitats further from breeding ponds than adults (Trenham and Shaffer 2005). More juvenile salamanders were captured at traps placed at 328, 656, and 1,312 feet (100, 200, and 400 meters) from a breeding pond than at 164 feet (50 meters). Approximately 20 percent of the captured juveniles were found at least 1,312 feet (400 meters) from the nearest breeding pond. The associated distribution curve suggested that 95 percent of juvenile salamanders were within 2,099 feet (640 meters) of the pond, with the remaining 5 percent being found at even greater distances. Preliminary results from the 2003-04 trapping efforts at the same study site detected juvenile tiger salamanders at even further distances, with a large proportion of the captures at 2,297 feet (700 meters) from the breeding pond (Trenham et al., unpublished data). Surprisingly, most juveniles captured, even those at 2,100 feet (640 meters), were still moving away from ponds (Ben Fitzpatrick, University of California at Davis, personal communication, 2004). In Santa Barbara County, juvenile California tiger salamanders have been trapped approximately 1,200 feet (366 meters) away while dispersing from their natal pond (Science Applications International Corporation, unpublished data). These data show that many California tiger salamanders travel far while still in the juvenile stage. Post-breeding movements away from breeding ponds by adults appear to be much smaller. During post-breeding emigration from aquatic habitat, radio-equipped adult tiger salamanders were tracked to burrows between 62 to 813 feet (19 to 248 meters) from their breeding ponds (Trenham 2001). These reduced movements may be due to adult California tiger salamanders exiting the ponds with depleted physical reserves, or drier weather conditions typically associated with the post-breeding upland migration period.

California tiger salamanders are also known to use several successive burrows at increasing distances from an associated breeding pond. Although previously sited studies provide information regarding linear movement from breeding ponds, upland habitat features appear to have some influence on movement. Trenham (2001) found that radio-tracked adults were more abundant in grasslands with scattered large oaks (*Quercus* species), than in more densely wooded areas. Based on radio-tracked adults, there is no indication that certain habitat types are favored as terrestrial movement corridors (Trenham 2001). In addition, captures of arriving adults and dispersing new metamorphs were evenly distributed around two ponds completely encircled by drift fences and pitfall traps. Thus, it appears that dispersal into the terrestrial habitat occurs randomly with respect to direction and habitat types.

Documented or potential tiger salamanders predators include coyotes (*Canis latrans*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), egrets (*Egretta* species), great blue herons (*Ardea herodias*), crows (*Corvus brachyrhynchos*), ravens (*Corvus corax*), garter snakes (*Thamnophis* species), bullfrogs (*Rana catesbeiana*), California red-legged frogs, mosquito fish (*Gambusia affinis*), and crayfish (*Procrambus* species). Domestic dogs have been observed eating California tiger salamanders at Lake Lagunitas at Stanford University (Sean Barry, ENTRIX, personal communication to C. Nagano, July 2004).

The California tiger salamander is imperiled throughout its range due to a variety of human activities (Service 2004). Current factors associated with declining tiger salamander populations include continued habitat loss and degradation due to agriculture and urbanization; hybridization with the non-native eastern tiger salamander (*Ambystoma tigrinum*) (Fitzpatrick and Shaffer 2004; Riley et al. 2003); and predation by introduced species. California tiger salamander populations are likely threatened by multiple factors but continued habitat fragmentation and colonization of non-native salamanders may represent the most significant current threats. Habitat isolation and fragmentation within many watersheds have precluded dispersal between sub-populations and jeopardized the viability of metapopulations (broadly defined as multiple subpopulations that occasionally exchange individuals through dispersal, and are capable of colonizing or "rescuing" extinct habitat patches). Other threats include predation and competition from introduced exotic species; possible commercial over-utilization; diseases; various chemical contaminants; road kill; illegal collection; and certain unrestrictive mosquito and rodent control operations. Currently, these various primary and secondary threats are largely not being offset by existing federal, state, or local regulatory mechanisms. The tiger salamander is also prone to chance environmental or demographic events, to which small populations are particularly vulnerable.

The specific effects of disease on the Central California tiger salamander are not known. Pathogens, fungi, water mold, bacteria, and viruses have been known to adversely affect other tiger salamander species or other amphibians. Pathogens are suspected of causing global amphibian declines (Davidson et al. 2003). Pathogen outbreaks have not been documented in the Central California tiger salamander, but Chytrid fungus infections (chytridiomycosis) have been detected in Central California tiger salamanders (Padgett-Flohr 2004). Chytridiomycosis and ranaviruses are a potential threat to the California tiger salamander because these diseases have been found to adversely affect other amphibians, including tiger salamanders (Longcore in litt. 2003; Lips in litt. 2003). Nonnative species, such as bullfrogs and nonnative tiger salamanders, are both located within the range of the Central California tiger salamander and have been identified as potential carriers of these diseases. Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e. contaminated boots or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in tiger salamanders being more susceptible to the effects of disease. Disease will likely become a growing threat because of the relatively small, fragmented remaining Central California tiger salamander breeding sites, the many stresses on these sites due to habitat losses and alterations, and the many other potential disease-enhancing anthropogenic changes which have occurred both inside and outside the species' range.

Thirty-one percent (221 of 711 records and occurrences) of all Central California tiger salamander records and occurrences are in Alameda, Santa Clara, San Benito (excluding the extreme western end of the County), southwestern San Joaquin, western Stanislaus, western Merced, and southeastern San Mateo counties. Of these counties, most of the records are from eastern Alameda and Santa Clara counties (Buckingham in litt. 2003; California Department of Fish and Game 2003; Service 2004b). The California Department of Fish and Game (2003) now considers 13 of these records from the Bay Area region as extirpated or likely to be extirpated.

The East Bay and Livermore Valley areas have undergone intensive urban development in recent years (California Department of Conservation 1996, 1998, 2000, 2002). The total human population of the counties in the Bay Area region increased by approximately 17 percent between 1990 and 2000 (4.5 million to 5.3 million people) (California Department of Forestry 1998). Most of the California tiger salamander natural historic habitat (vernal pool grasslands) available in this region has been lost due to urbanization and conversion to intensive agriculture (Keeler-Wolf and Elaml 1998). California tiger salamanders are now primarily restricted to artificial breeding ponds, such as bermed ponds or stock ponds which are typically located at higher elevations (California Department of Fish and Game 2003).

Of the 140 California tiger salamander localities where wetland habitat was identified, only 7 percent were located in vernal pools (California Department of Fish and Game 2003). The Bay Area region occurs within the Central Coast and Livermore vernal pool regions (Keeler-Wolf et al. 1998). Vernal pools within the Coast Range are more sporadically distributed than vernal pools in the Central Valley (Holland 2003). In San Benito and Santa Clara counties, Central Coast vernal pools have been destroyed and degraded due to agriculture. The vernal pools at Stanford in Santa Clara County have been destroyed and degraded due to recreation and development (Keeler-Wolf et al. 1998). The annual loss of vernal pools from 1994 to 2000 in Monterey, San Benito, San Luis Obispo, Santa Barbara, and Ventura counties was 2 to 3 percent. This rate of loss suggests that vernal pools in these counties are disappearing faster than previously reported (Holland 2003). Most of the vernal pools in the Livermore Region in Alameda County have been destroyed or degraded by urban development, agriculture, water diversions, poor water quality, and long-term overgrazing (Keeler-Wolf et al. 1998). During the 1980s and 1990s, vernal pools were lost at a 1.1 percent annual rate in Alameda County (Holland 1998).

Due to the extensive losses of vernal pool complexes and their limited distribution in the Bay Area region, many California tiger salamander breeding sites consist of artificial water bodies. Overall, 89 percent (124) of the identified water bodies are stock, farm, or berm ponds used for cattle and/or as a temporary water source for small farm irrigation (California Department of Fish and Game 2003). This possibly places the California tiger salamander at great risk of hybridization with non-native tiger salamanders, especially in Santa Clara and San Benito counties. Without long-term maintenance, the longevity of artificial breeding habitats is uncertain relative to naturally occurring vernal pools that are dependent on the continuation of seasonal weather patterns (Shaffer in litt. 2003).

Shaffer et al. (1993) found that the East Bay counties of Alameda and Contra Costa supported the greatest concentrations of California tiger salamander. California tiger salamander populations in the Livermore Valley are severely threatened by the ongoing conversion of grazing land to subdivisions and vineyards (Stebbins 1989; East Bay Regional Park District 1999). Proposed land conversion continues to target large areas of California tiger salamander habitat. One such project in Alameda County totals 700 acres (283 hectares) (East Bay Regional Parks District 2003). Other proposed projects located within the California tiger salamander's distribution include another 310-acre (125-hectare) project in Alameda County, two in San Joaquin County totaling 12,427 acres (5,029 hectares), and a 19-acre (7.7-hectare) project in Santa Clara County.

According to the Biological Assessment for this project, California tiger salamanders are known to breed within at several sites within 1.3 miles (2.1 kilometers) of the action area. One breeding pond is within 260 feet (79.25 meters) of the east of the eastern end of Segment D. There are several other potential California tiger salamander breeding ponds within 1.3 miles (2.1 kilometers) of the action area that Caltrans was unable to investigate due to the limitations of private property access. There are also ground squirrel burrows and other features that provide suitable upland refugia for the California tiger salamander within and immediately adjacent to the action area. Therefore, the Service has determined it is reasonable to conclude the California tiger salamander inhabits segments B, C, and D of the action area, based on the biology and ecology of the species, the presence of suitable habitat, as well as the recent observations of this animal. Segment A of the action area is surrounded by agricultural development and does not appear to provide aquatic, upland, or dispersal habitat for the California tiger salamander.

California Tiger Salamander Critical Habitat

Critical habitat for the California tiger salamander was proposed on August 10, 2004 (Service 2004c), designated on August 23, 2005 (Service 2005), and became effective on September 22, 2005. The designation included approximately 199,109 acres (80,576 hectares) located within 19 counties. This includes areas within Santa Clara County and more specifically, portions of segments B, C, and D of the action area for the proposed State Route 152 Safety Operational Improvements Project.

Critical habitat is defined in section 3 of the Act as—(i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which listing under the Act is no longer necessary.

Critical habitat receives protection under section 7 of the Act through the prohibition against destruction or adverse modification of critical habitat with regard to actions carried out, funded, or authorized by a Federal agency. Section 7 requires consultation on Federal actions that are likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation does not allow government or public access to private lands.

To be included in a critical habitat designation, the habitat within a given area occupied by the California tiger salamander must first have features that are "essential to the conservation of the species." These primary constituent elements are both physical and biological features that are essential to the conservation of the California tiger salamander, and may require special management considerations and protection (50 CFR § 424.14). Such physical and biological features include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing (or development) of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of the species.

Based on our current knowledge of the life history, biology, and ecology of the Central population of the California tiger salamander and the relationship of its essential life history functions to its habitat, the Service has determined that the Central population of the California tiger salamander requires the following primary constituent elements:

(1) Standing bodies of fresh water (including natural and manmade (e.g., stock ponds) ponds, vernal pools, and other ephemeral or permanent water bodies which typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.

(2) Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that California tiger salamanders depend upon for food, shelter, and protection from the elements and predation.

(3) Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

The relationship between each of these primary constituent elements and the conservation of the salamander is described in more detail below (Service 2005).

Essential Aquatic Habitat. The requisite aquatic habitat described as the first primary constituent element is essential for the Central population of the California tiger salamander for providing space, food, and cover necessary to support reproduction and to sustain early life history stages of larval and juvenile California tiger salamanders. Aquatic and breeding habitats consist of fresh water bodies, including natural and artificially made (e.g., stock) ponds, vernal pools, and vernal pool complexes. To be considered essential, aquatic and breeding habitats must have the capability to hold water for a minimum of 12 weeks in the winter or spring in a year of average rainfall, the amount of time needed for salamander larvae to metamorphose into juveniles capable of surviving in upland habitats. During periods of drought or less-than-average rainfall, these sites may not hold water long enough for individuals to complete metamorphosis; however, these sites would still be considered essential because they constitute breeding habitat in years of average rainfall. Without these essential aquatic and breeding habitats, the California tiger salamander would not survive, reproduce, complete metamorphosis, and survive to adulthood.

Essential Upland Habitat. Essential upland habitats containing underground refugia described as the second primary constituent element are essential for the survival of the Central population's adult California tiger salamanders and juveniles that have recently undergone metamorphosis. Adult and juvenile California tiger salamanders are primarily terrestrial. Adult California tiger salamanders enter aquatic habitats only for relatively short periods of time to breed. For the majority of their life cycle, California tiger salamanders survive within upland habitats containing underground refugia in the form of small mammal burrows. The Central population of the California tiger salamanders cannot persist without upland underground refugia. These underground refugia provide protection from the hot, dry weather typical of California in the nonbreeding season. The Central population of the California tiger salamander also forages in the small mammal burrows and rely on the burrows for protection from predators. The presence of small burrowing mammal populations is essential for constructing and maintaining burrows. Without the continuing presence of small mammal burrows in upland habitats, California tiger salamanders would not be able to survive.

Essential Dispersal Habitat. The dispersal habitats described as the third primary constituent element are essential for the conservation of the Central population of the California tiger salamander. Protecting the ability of California tiger salamander to move freely across the landscape in search of suitable aquatic and upland habitats is essential in maintaining gene flow and for recolonization of sites that may become temporarily extirpated. Lifetime reproductive success for the Central population of the California tiger salamander and other tiger salamanders is naturally low. Trenham et al. (2000) found the average female bred 1.4 times and produced 8.5 young that survived to metamorphosis per reproductive effort. This reproduction resulted in roughly 11 metamorphic offspring over the lifetime of a female. In part, this low reproductive success is due to the extended time it takes for California tiger salamander to reach sexual maturity; most do not breed until four or five years of age. While individuals may survive for more than ten years, many breed only once. Combined with low survivorship of metamorphosed individuals (in some populations, fewer than 5 percent of marked juveniles survive to become breeding adults [Trenham et al. 2000]), reproductive output in most years is not sufficient to maintain populations. This trend suggests that the species requires occasional large breeding events to prevent extirpation or extinction (Trenham et al. 2000). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events, as well as human-caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated vernal pools or ponds can quickly extirpate an occurrence of the species. Therefore, an essential element for successful conservation is the presence and maintenance of sets of interconnected sites that are within the dispersal distance of other ponds (Trenham et al. 2001).

Dispersal habitats described as the third primary constituent element are also essential in preserving the Central population of the California tiger salamander's population structure. The life history and ecology of the California tiger salamander make it likely that this species has a metapopulation structure (Hanski and Gilpin 1991). A metapopulation is a set of extant (currently in existence) occurrences or breeding sites within an area, where typical migration from one local occurrence or breeding site to other areas containing suitable habitat is possible, but not routine. Movement between areas containing suitable upland and aquatic habitats (i.e., dispersal) is restricted due to inhospitable conditions around and between areas of suitable habitats. Because many of the areas of suitable habitats may be small and support small numbers of salamanders, local extinction of these small units may be common. A metapopulation's persistence depends on the combined dynamics of these local extinctions and the subsequent recolonization of these areas through dispersal (Hanski and Gilpin 1991; Hanski 1994).

Essential dispersal habitats generally consist of upland areas adjacent to essential aquatic habitats that are not isolated from essential aquatic habitats by barriers that Central population of the California tiger salamander cannot cross. Essential dispersal habitats provide connectivity among California tiger salamander suitable aquatic and upland habitats. While the Central population of the California tiger salamander can bypass many obstacles, and do not require a particular type of habitat for dispersal, the habitats connecting essential aquatic and essential upland habitats need to be free of barriers (e.g., a physical or biological feature that prevents salamanders from dispersing beyond the feature) to function effectively. Examples of barriers are areas of steep topography devoid of soil or vegetation. Agricultural lands such as row crops, orchards, vineyards, and pastures do not constitute barriers to the dispersal of California tiger salamander. We are designating critical habitat that allows for dispersal between extant occurrences within 0.70 miles (1.1 kilometers) of each other. This distance is consistent with the final listing rule (Service 2004b) and the final critical habitat designation for the California tiger salamander in Santa Barbara County (Service 2004a). Trenham (personal communication with the Service 2004) predicted that a distance of 0.70 miles (1.1 kilometers) would capture 99 percent of all inter-pond movements between breeding adults. Including inter-pond movements within the critical habitat designation is essential to the conservation of the species because these movements capture the extent of genetic exchange between individuals and help support a long term conservation strategy for this species.

As part of the designation process, the Service divided the current range of the Central population into four geographic regions: (1) Central Valley; (2) Southern San Joaquin Valley; (3) East Bay; and (4) Central Coast. These four geographic regions are designed to provide needed aquatic and upland refugia habitats for adult salamanders to maintain and sustain extant occurrences of California tiger salamander throughout their geographic and genetic ranges and provide those habitat components essential for the conservation of the species. Individual units of critical habitat are defined within each of the four geographic regions.

Units of critical habitat were determined based on the occurrence of the primary constituent elements along with occurrence data; geographic distribution; Geographic Information Systems (GIS) data layers for habitat mapping; vegetation, topography, watersheds, and current land uses; scientific information on the biology and ecology of the California tiger salamander; and accepted conservation principles for threatened or endangered species. Segments B, C, and D of the action area for the proposed State Route 152 Safety Operational Improvements Project are located within critical habitat Unit 12 (San Felipe Unit) of the East Bay Geographic Region for the Central population of the California tiger salamander.

Unit 12 is comprised of 6,642 acres (2,688 hectares) of habitat and is essential to the conservation of the species because it is needed to maintain the current geographic and ecological distribution of the species within the Bay Area Geographic Region. Unit 12 represents part of the center of the distribution within the Bay Area Geographic Region and the southernmost portion of Santa Clara County, northern San Benito County, and center of the Central Coast vernal pool region. It contains all three of the primary constituent elements and 10 extant occurrences of the species. Unit 12 generally is found west of Camadero, south of Kickham Peak, east of San Joaquin Peak, and north of Dunneville. Land ownership is private. Threats include erosion and sedimentation, pesticide application, introduction of predators such as bullfrogs and mosquito fish, disturbance activities associated with development that may alter the hydrologic functioning of the aquatic habitat, upland disturbance activities that may alter upland refugia and dispersal habitat, and activities such as road development and widening that may develop barriers for dispersal.

As described in the Biological Assessment for this project, the action area does not include essential aquatic habitat but does include essential upland and dispersal primary constituent elements for the Central population of the California tiger salamander. Essential aquatic habitat is located adjacent to segments B, C, and D and as close as 260 feet (79.25 meters) to the eastern end of Segment D.

The Service determined that conserving the Central population of the California tiger salamander over the long-term requires a five-pronged approach: (1) Maintaining the current genetic structure across the species range; (2) maintaining the current geographic, elevational, and ecological distribution; (3) protecting the hydrology and water quality of breeding pools and ponds; (4) retaining or providing for connectivity between breeding locations for genetic exchange and recolonizaiton; and (5) protecting sufficient barrier-free upland habitat around each breeding location to allow for sufficient survival and recruitment to maintain a breeding population over the long-term (Service 2005).

The Service also believes that areas with critical habitat for the Central population of the California tiger salamander may require certain management considerations or protections due to the following threats: (1) activities that introduce or promote the occurrence of bullfrogs and fish; (2) activities that could disturb aquatic habitats during the breeding season; (3) activities that impair the water quality of aquatic breeding habitats; (4) activities that would reduce small mammal populations to the point that there is insufficient underground refugia used for foraging, protection from predators, and shelter from the elements; (5) activities that create barriers impassible for salamanders or road crossings that increase mortality in upland habitat between extant occurrences in breeding habitat; and (6) activities on adjacent uplands that disrupt vernal pool complexes' ability to support California tiger salamander breeding function (Service 2005).

It is important to note that section 4 of the Act requires that the Service designate critical habitat on the basis of what we know at the time of designation. Habitat is often dynamic, and species may move from one area to another over time. Furthermore, the Service recognizes that designation of critical habitat may not include all of the habitat areas that may eventually be determined to be necessary for the recovery of the species. For these reasons, critical habitat designations do not signal that habitat outside the designation is unimportant or may not be required for recovery.

Areas that support populations, but are outside the critical habitat designation, will continue to be subject to conservation actions implemented under section 7(a)(1) of the Act and to the regulatory protections afforded by the section 7(a)(2) jeopardy standard, as determined on the basis of the best available information at the time of the action.

California Red-legged Frog

The red-legged frog was listed as a threatened species on May 23, 1996 (Service 1996). Please refer to the final rule and the Recovery Plan for the California Red-Legged Frog (*Rana aurora draytonii*) (Service 2002) for additional information on this species.

This species is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches (3.81 to 12.95 centimeters) in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have lighter centers (Stebbins 2003) and dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 0.6 to 3.1 inches (1.52 to 7.87 centimeters) in length, and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Red-legged frogs have paired vocal sacs and vocalize in air (Hayes and Krempels 1986). Female frogs deposit egg masses on emergent vegetation, allowing the egg mass floats on the surface of the water (Hayes and Miyamoto 1984). Red-legged frogs breed from November through March with earlier breeding records occurring in southern localities (Storer 1925). Individuals occurring in coastal drainages are active year-round (Jennings et al. 1992), whereas those found in interior sites are normally less active during the cold season.

The historic range of the red-legged frog extended coastally from the vicinity of Elk Creek in Mendocino County, California, and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The red-legged frog was historically documented in 46 counties but the taxa now remains in 238 streams or drainages within 23 counties. This represents a loss of 70 percent of its former range (Service 2002). Red-legged frogs are still locally abundant within portions of the San Francisco Bay area and the central coast. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse Ranges. The species is believed to be extirpated from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico (California Department of Fish and Game 2004).

Adult red-legged frogs prefer dense, shrubby or emergent riparian vegetation closely associated with deep (>2.3 feet [0.7 meters]), still, or slow-moving water (Hayes and Jennings 1988). However, frogs also have been found in ephemeral creeks and drainages and in ponds that may or may not have riparian vegetation. The largest densities of red-legged frogs currently are associated with deep pools with dense stands of overhanging willows (*Salix* species) and an intermixed fringe of cattails (*Typha latifolia*) (Jennings 1988). Red-legged frogs disperse upstream and downstream of their breeding habitat to forage and seek sheltering habitat.

During other parts of the year, habitat includes nearly any area within 1-2 miles (1.6-3.2 kilometers) of a breeding site that stays moist and cool through the summer (Fellers 2005). According to Fellers (2005), this can include vegetated areas with coyote bush (*Baccharis pilularis*), California blackberry thickets (*Rubus ursinus*), and root masses associated with willow (*Salix* species) and California bay trees (*Umbellularis californica*). Sometimes the non-breeding habitat used by red-legged frogs is extremely limited in size. For example, non-breeding red-legged frogs have been found in a 6-foot (1.8-meter) wide coyote bush thicket growing along a tiny intermittent creek surrounded by heavily grazed grassland (Fellers 2005). Sheltering habitat for red-legged frogs is potentially all aquatic, riparian, and upland areas within the range of the species and includes any landscape features that provide cover, such as existing animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay stacks may also be used. Incised stream channels with portions narrower and depths greater than 18 inches (45.7 centimeters) also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the survival of red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

Red-legged frogs do not have a distinct breeding migration (Fellers 2005). Adult frogs are often associated with permanent bodies of water. Some frogs remain at breeding sites all year while others disperse. Dispersal distances are typically less than 0.5 mile (0.8 kilometers), with a few individuals moving up to 1-2 miles (1.6-3.2 kilometers) (Fellers 2005). Movements are typically along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005). Dispersing frogs in northern Santa Cruz County traveled distances from 0.25 miles (0.4 kilometers) to more than 2 miles (3.2 kilometers) without apparent regard to topography, vegetation type, or riparian corridors (Bulger et al. 2003).

Egg masses contain about 2,000 to 5,000 moderate sized (0.08 to 0.11 inches [0.2 to 0.3 centimeters] in diameter), dark reddish brown eggs and are typically attached to vertical emergent vegetation, such as bulrushes (*Scirpus* species) or cattails (Jennings et al. 1992). Red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Eggs hatch in 6 to 14 days (Jennings 1988). In coastal lagoons, the most significant mortality factor in the pre-hatching stage is water salinity (Jennings et al. 1992). Eggs exposed to salinity levels greater than 4.5 parts per thousand results in 100 percent mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3.5 to 7 months after hatching (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1990). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings et al. 1992). Sexual maturity normally is reached at 3 to 4 years of age (Storer 1925; Jennings and Hayes 1985). Red-legged frogs may live 8 to 10 years (Jennings et al. 1992). Populations of red-legged frogs fluctuate from year to year. When conditions are favorable red-legged frogs can experience extremely high rates of reproduction and thus produce large numbers of dispersing young and a concomitant increase in the number of occupied sites. In contrast, red-legged frogs may temporarily disappear from an area when conditions are stressful (e.g., drought).

The diet of red-legged frogs is highly variable. Hayes and Tennant (1985) found invertebrates to be the most common food items. According to their data, vertebrates, such as Pacific tree frogs and California mice (*Peromyscus californicus*) represent over half the prey mass eaten by larger frogs (Hayes and Tennant 1985). Hayes and Tennant (1985) found juvenile frogs to be active diurnally and nocturnally, whereas adult frogs were largely nocturnal. Feeding activity probably occurs primarily along the shoreline and on the surface of the water (Hayes and Tennant 1985). The diet of red-legged frogs is not well studied, but their diet is likely similar to other ranid frogs that feed on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005; Kupferberg 1996a, 1996b).

Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish (*Procambarus clarkii*), signal crayfish (*Pacifastacus leniusculus*), and several species of warm water fish including sunfish (*Lepomis* species), goldfish (*Carassius auratus*), common carp (*Cyprinus carpio*), and mosquitofish (L. Hunt, in litt. 1993; S. Barry, in litt. 1992; S. Sweet, in litt. 1993). Habitat loss, non-native species introduction, and urban encroachment are the primary factors that have adversely affected the red-legged frog throughout its range.

Several researchers in central California have noted the decline and eventual disappearance of red-legged frog populations once bullfrogs became established at the same site (L. Hunt, in litt. 1993; S. Barry, in litt. 1992; S. Sweet, in litt. 1993). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs (*Rana aurora aurora*), and suggested that bullfrogs could prey on subadult northern red-legged frogs as well. Bullfrogs may also have a competitive advantage over red-legged frogs. For instance, bullfrogs are larger and possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual female can produce as many as 20,000 eggs (Emlen 1977). Further more, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with red-legged frog reproduction. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990; Twedt 1993; M. Jennings, in litt.1993; R. Stebbins in litt. 1993). Thus bullfrogs are able to prey upon and out-compete red-legged frogs, especially in sub-optimal habitat.

The urbanization of land within and adjacent to red-legged frog habitat has also adversely affected red-legged frogs. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks red-legged frog dispersal, and the introduction of predatory fishes and bullfrogs. This report further identifies the conversion and isolation of perennial pool habitats resulting from urbanization as an ongoing impact to red-legged frogs.

The California red-legged frog may be susceptible to many of the same pathogens, fungi, water mold, bacteria, and viruses have been known to adversely affect tiger salamander species or other amphibians. As with the California tiger salamander, Chytridiomycosis and ranaviruses may be a particular developing concern for California red-legged frog populations. Mao et al. (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which was also presented in sympatric three-spined sticklebacks (*Gasterosteus aculeatus*) in northwestern California. Ingles (1932a, 1932b, and 1933 cited in Fellers 2005) reported four species of trematodes from red-legged frogs, but he later synonymized two of them (found them to be the same as the other two). As mentioned for the California tiger salamander, nonnative species, such as bullfrogs and nonnative tiger salamanders, are both located within the range of the California red-legged frog and have been identified as potential carriers of these diseases. Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e. contaminated boots or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in red-legged frogs being more susceptible to the effects of disease. Disease will likely become a growing threat because of the relatively small, fragmented remaining California red-legged frog breeding sites, the many stresses on these sites due to habitat losses and alterations, and the many other potential disease-enhancing anthropogenic changes which have occurred both inside and outside the species' range.

The recovery plan for red-legged frogs identifies eight Recovery Units (Service 2002). The establishment of these Recovery Units is based on the Recovery Team's determination that various regional areas of the species' range are essential to its survival and recovery. The status of the red-legged frog will be considered within the smaller scale of Recovery Units as opposed to the overall range. These Recovery Units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of the range of the California red-legged frog. The goal of the draft recovery plan is to protect the long-term viability of all extant populations within each Recovery Unit. Within each Recovery Unit, core areas have been delineated and represent contiguous areas of moderate to high red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations that, combined with suitable dispersal habitat, will allow for the long term viability within existing populations. This management strategy will allow for the recolonization of habitat within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of red-legged frogs.

The State Route 152 Safety Operational Improvements Project is within Recovery Unit 6 (Diablo Range and Salinas Valley) (Service 2002). The majority of segments B, C, and D fall within Core Area #17 (Santa Clara Valley) and the eastern end of Segment D may extend into Core Area #16 (East San Francisco Bay) (Service 2002). The conservation needs for the Santa Clara Valley core area are: (1) protecting existing populations; and (2) controlling non-native predators. The conservation needs for the East San Francisco Bay core area are: (1) protecting existing populations; (2) studying the effects of grazing on habitat; (3) reducing grazing impacts; (4) protecting habitat connectivity; (5) minimizing impacts from off-road travel and other recreational activities; (6) reducing impacts of urban development; and (7) protecting habitat buffers from nearby urbanization.

According to the Biological Assessment, there are numerous potential breeding ponds for California red-legged frogs and documented observations of California red-legged frogs within 2 miles (3.2 kilometers) of the action area. Caltrans has documented breeding from a stock pond located, approximately 260 feet (79.25 meters) east of the eastern end of Segment D (Caltrans 2000). California red-legged frog egg masses and juvenile red-legged frogs were observed at this location in 2000 (Caltrans 2000). There are several potential California red-legged frog breeding ponds within 1.3 miles (2.1 kilometers) of the action area that Caltrans was unable to investigate due to the limitations of private property access (Caltrans 2005b). These ponds are also described as potential breeding locations for California tiger salamander (Caltrans 2005a). There is potential for California red-legged frogs to be moving north and south across segments B, C, and D to access upland and aquatic habitat (stock ponds, San Felipe Lake, unnamed drainages, and Pacheco Creek) on both sides of the action area. California red-legged frogs have been documented to move more than 2 miles (3.2 kilometers). Therefore, the Service has determined it is reasonable to conclude the red-legged frog disperses through and inhabits the action area, based on the biology and ecology of this listed species, the presence of suitable habitat, as well as the recent observations of this animal.

Effects of the Proposed Action

San Joaquin Kit Fox

Construction of the road improvement project will result in the temporary loss and degradation of 19.77 acres (8.00 hectares) and the permanent loss of 4.03 acres (1.63 hectares) of the habitat of the San Joaquin kit fox. The proposed action likely will result in a number of adverse effects to this listed canine. There is a likelihood of direct injury or mortality to the animal resulting from either being crushed or entombed in the dens due to construction activities, vehicle strikes, falling into trenches or pits, being shot, being buried after becoming trapped in pipes, injured or killed by house cats (*Felis domesticus*) or dogs owned by project personnel; poisoned by rodenticides or other pesticides, injured or killed by predators attracted to food or trash at the site, or harassment from noise and vibration. San Joaquin kit foxes may be adversely affected by construction activities temporarily blocking travel corridors in grassland and agricultural areas, or by evening construction activities disturbing night time foraging.

San Joaquin kit fox mortality and injury may occur when the animals attempt to cross roads and are hit by cars, trucks, or motorcycles. The majority of strikes likely occur at night when the animals are most active. Driver visibility also is lower at night increasing the potential for strikes. Such strikes are usually fatal for an animal the size of a kit fox. Thus, vehicle strikes are a direct source of mortality for the San Joaquin kit fox. If vehicle strikes are sufficiently frequent in a given locality, they could result in reduced kit fox abundance. The death of kit foxes during the November-January breeding season could result in reduced reproductive success. Death of females during gestation or prior to pup weaning could result in the loss of an entire litter of young, and therefore, reduced recruitment of new individuals into the population.

This proposed project will result in increased speed of the traffic flow on State Route 152 from the State Route 152/State Route 156 interchange to the intersection of State Route 152 and the traffic control point at the intersection with Ferguson Road. The project is likely to result in traffic slowdowns with the addition of two turn pockets and two passing lane segments within this approximately 9 mile (14.5 kilometer) stretch of highly traveled roadway. Following the completion of the proposed improvement project, vehicles will travel through the area at a higher rate of speed which will likely result in a higher risk of vehicle strikes, locally, for San Joaquin kit foxes or other wildlife attempting to cross State Route 152.

In addition, the proposed project will include the replacement of 11 of the 18 existing culverts passing under State Route 152 within the four project segments. Caltrans plans to replace these culverts with larger culverts that may provide enhanced passage for wildlife under the roadways.

Four existing 18 inch (45 centimeter) culverts will be replaced with 24 inch (60 centimeter) culverts. Two other existing 18 inch (45 centimeter) culverts will be replaced with 30 inch (75 centimeter) culverts and existing 30 inch (75 centimeter) culverts will be replaced with 47.2 inch (120 centimeter) culverts. These new culvert dimensions exceed the 1.6 foot (50 centimeter) diameter units recommended for kit fox passage (Bjurlin and Cypher 2003). Although there is no conclusive evidence suggesting that kit foxes selectively utilize protective roadway passage features such as culverts (B. Cypher, Endangered Species Recovery Program, Fresno, personal communication to J. Cleckler, Fish and Wildlife Service, Sacramento, California, September 27, 2005), the proposed project design will increase the opportunities for wildlife passage under State Route 152.

Occurrences of vehicle strikes involving San Joaquin kit foxes have been well documented, and such strikes occur throughout the range of the species. Sources of kit fox mortality were examined during 1980-1995 at the Naval Petroleum Reserves in California in western Kern County (Cypher et al. 2000). During this period, 341 adult San Joaquin kit foxes were monitored using radio telemetry, and 225 of these animals were recovered dead. Of these, 20 were struck by vehicles; 9 percent of adult kit mortalities were attributed to vehicles, and 6 percent of all monitored adults were killed by vehicles. During this same period, 184 juvenile (<1 year old) kit foxes were monitored. Of these, 142 were recovered dead and 11 were killed by vehicles; 8 percent of juvenile kit fox mortalities were attributed to vehicles and 6 percent of all monitored juveniles were killed by vehicles. For both adults and juveniles, vehicle strikes accounted for less than 10 percent of all San Joaquin kit fox deaths in most years. However, in some years, vehicles accounted for about 20 percent of deaths. Predators, primarily coyotes and bobcats, were the primary source of mortality at the Naval Petroleum Reserves. In addition, 70 kit foxes, both radio collared and non-collared, were found dead on roads in and around the Naval Petroleum Reserves during 1980-1991 (U.S. Department of Energy 1993). Of these, 34 were hit by vehicles on the approximately 990 miles (1,600 kilometers) of roads at the Reserve, and 36 were struck on the approximately 50 miles (80 kilometers) of State and County roads (e.g., State Route 119, Elk Hills Road), where traffic volumes and average vehicle speeds were higher. In western Merced County, 28 San Joaquin kit foxes were radio-collared during 1985-1987 (Briden et al. 1992). Seventeen were found dead and 2 (12 percent) of these deaths were attributed to vehicles. In the City of Bakersfield, 113 San Joaquin kit foxes were radio-collared and monitored during 1997-2000 (Cypher 2000). Thirty-five were recovered dead (123 adults and 12 pups); 9 adults (39 percent) and 6 pups (50 percent) were attributed to vehicle strikes. At this urban site, coyotes and bobcats are rare, and vehicles are the primary source of kit fox mortality. However, survival rates are higher than rates among kit foxes in non-urban areas, and vehicles do not appear to be limiting the population size.

Vehicles constitute a consistent source of mortality for the kit fox, based on the frequency with which vehicle strikes occur. However, the precise effect of vehicle strikes on the San Joaquin kit fox has not been adequately investigated. According to Morrell (1970), "The automobile is by far the major cause of reported San Joaquin kit fox deaths - 128 of 152 deaths reported were caused by automobiles." Morrell acknowledged that the numbers were based on non-radio-collared kit foxes and therefore were biased because road-killed foxes are conspicuous and easily observed compared to animals dying from other causes. Predators such as coyotes, bobcats, non-native red foxes, and domestic dogs likely constitute a higher source of mortality than vehicle strikes (Service 1998; Cypher 2000). Vehicle-related mortality has significantly affected other listed or rare species. Vehicles caused 49 percent of the mortality documented among endangered Florida panthers (*Puma concolor coryi*) (Maehr et al. 1991). With a remaining population of 20-30 animals, the loss of any to vehicles likely constitutes a significant population effect. Similarly, at least 15 percent of the remaining 250-300 key deer (*Odocoileus virginianus clavium*) are killed annually by vehicles (Tubak 1999), and this mortality is considered to be a limiting factor for this endangered species (Service 1985). Mortality from vehicles was the primary source of mortality for endangered ocelots (*Felis pardalis*) in Texas (Tubak 1999), and also contributed to the failure of a lynx (*Lynx canadensis*) reintroduction project in New York (Aubrey et al. 1999). Rudolph et al. (1999) estimated that road-associated mortality may have depressed populations of Louisiana pine snakes (*Pituophis ruthveni*) and timber rattlesnakes (*Crotalus horridus*) by over 50 percent in eastern Texas, and this mortality may be a primary factor in local extirpations of timber rattlesnakes (Rudolph et al. 1998). Mortality from vehicles also is contributing to the reduction in the status of the prairie garter snake (*Thamnophis radix radix*) in Ohio (Dalrymple and Reichenbach 1984), and was a limiting factor in the recovery of the endangered American crocodile (*Crocodylus acutus*) in Florida (Kushland 1988). In Florida, threatened Florida scrub-jays (*Aphelocoma coerulescens*) suffered higher mortality in territories near roads, as well as reduced productivity due to vehicle strikes of both breeding adults and young (Mumme et al. 1999).

Road construction and improvement activities associated with the proposed action may result in a disturbance effect on nearby San Joaquin kit foxes. Disturbance can result from noise, vibration, odors, or human activity. Disturbance may affect the kit foxes by interfering with sensory perception which could interfere with their ability to locate prey, pups, or mates, or detect approaching predators. Disturbance could induce stress which may affect physiological parameters or behavior. The resulting effects could include increase energetic requirements, decrease reproductive output, decrease immunological functions, altered space use patterns, displacement, or possibly death. Observations from a variety of sources and situations suggest that San Joaquin kit foxes may not be significantly affected by disturbance, even when the source is prolonged or continuous (Cypher 2000). However, individual animals may be more affected than others, and it is unknown whether disturbance may result in reduced local abundance.

An increase in the ambient noise level is not, in itself, likely to cause direct harm to kit foxes. No specific research has been performed on this species but a "safe, short-term level" for humans has been determined to be 75 decibels (dBA) (NIH 1990; Burglund and Lindvall 1995). The mechanisms leading to permanent hearing damage are the same for all mammals (NIH 1990). However, the enlarged pinna and reduced tragi of kit foxes indicate that hearing is more acute than in humans (Jameson and Peeters 1988). Hearing loss in humans has been correlated with cognitive dysfunction (NIH 1990). However, variation in response to intense noise has been found to vary, in humans, by as much as 30 to 50 dBA between individuals (NIH 1990). Similar variation has been found in animal studies as well (NIH 1990). Hearing loss was greater in male than in female humans; however, this may be caused by environmental factors (NIH 1990). Also, younger animals have been shown to be more susceptible to noise-induced hearing loss (NIH 1990). The ability to habituate to noise appears to vary widely between species (NPS 1990). Typical construction machinery produces noise in the range of 75 dBA (arc-welder) to 85 dBA (bulldozer) (Burglund and Lindvall 1995). Long-term noise levels of 85 dBA are recognized to cause permanent hearing damage in humans (NIH 1990). Noise at the 85 dBA level has been correlated with hypertension in Rhesus monkeys (*Macaca fasicularis*) (Cornman 2001). Increased reproductive failure in laboratory mice (*Mus musculus*) was found to occur after a level of 82-85 dBA for one week (Cornman 2001). However, measurable loss of hearing was found to occur in chinchillas (*Chinchilla laniger*) at a sustained level of 70 dBA (Peters 1965). Hearing loss from motorcycle traffic has been documented for the kangaroo rat (*Dipodomys* species) (Bondello and Brattstrom 1979) and desert kangaroo rats (*Dipodomys deserti*) showed a significant reduction in reaction distance to the sidewinder (*Crotalus cerastes*) after exposure to 95 dBA (Cornman 2001). Other desert mammals appear to sustain the same effects (Bondello and Brattstrom 1979). Aircraft noise has produced accelerated heart-rates in pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), and elk (*Cervus elaphus*) (MacArthur 1976; Workman et al. 1992; all in NPS 1994).

Hearing loss is correlated with distance from the source of the noise. At a level of 110 dBA, guinea pigs (*Cavia porcellus*) suffered long-term hearing loss at distances of 75 and 150 feet (46 meters), temporary loss at a distance of 300 feet (91.4 meters), and no measurable loss at 4,500 feet (1,372 meters) (Gonzales et al. 1970). In water, noise is reduced at a rate of 5 dBA for each doubling of the distance to the source (Komanoff & Shaw 2000). For instance, a noise that measured 20 dBA at 60 feet (18.3 meters) registers 15 dBA at 120 feet (36.6 meters).

Harassment from long-term noise may cause kit foxes to eventually vacate the project site and adjacent areas. California condors (*Gymnogyps californianus*) have been shown to abandon nesting sites in response to vehicle noise (Shaw 1970). Grizzly bears (*Ursus arctos*), mountain goats (*Oreamnos canadensis*), caribou (*Rangifer* species), and bighorn sheep (*Ovis* species) have all been found to abandon foraging or calving areas in response to aircraft noise (Chadwick 1973; McCourt et al. 1974; Ballard 1975; Krausman and Hervert 1983; Gunn et al. 1985; Bleich 1990; all in NPS 1994).

Project effects on San Joaquin kit foxes are expected to be greater during the den selection, pregnancy, and early pup dependency periods of the breeding cycle (December through July) than at other times of the year. San Joaquin kit foxes may exhibit increased sensitivity to disturbance during this period and therefore, ideally, surface-disturbing activities should occur between August and November. Where this is possible, it is anticipated that surface-disturbing activities and other actions likely to result in harassment will be minimized in the vicinity of San Joaquin kit fox natal dens. Habitat compensation measures are anticipated to minimize habitat affects due to project implementation.

The proposed action could result in the introduction of chemical contaminants to the action area. Contaminants could be introduced in several ways. Substances used in project construction could leach out or wash off into adjacent habitat. Vehicle exhaust emissions can include hazardous substances which may concentrate in soils along roads. Heavy metals such as lead, aluminum, iron, cadmium, copper, manganese, titanium, nickel, zinc, and boron are all emitted in vehicle exhaust (Trombulak and Frissell 2000). Concentrations of organic pollutants (e.g., Dioxins, polychlorinated biphenyls) are higher in soils along roads (Benfenati et al. 1992). Ozone levels are higher in the air near roads (Trombulak and Frissell 2000). Vehicles may leak hazardous substances such as motor oil and antifreeze. Although the quantity leaked by a given vehicle may be minute, these substances can accumulate on roads and then get washed into the adjacent environment by runoff during rain storms. An immense variety of substances could be introduced during accidental spills of materials. Such spills can result from small containers falling off passing vehicles, or from accidents resulting in whole loads being spilled. Large spills may be partially or completely mitigated by clean-up efforts, depending on the substance.

San Joaquin kit foxes using areas adjacent to the road could be exposed to any contaminants that are present in the action area. Exposure pathways could include inhalation, dermal contact, direct ingestion, ingestion of contaminated soil or plants, or consumption of contaminated prey. Exposure to contaminants could cause short- or long-term morbidity, possibly resulting in reduced productivity or mortality. Carcinogenic substances could cause genetic damage resulting in sterility, reduced productivity, or reduced fitness among progeny. Contaminants also may have the same effect on kit fox prey species. This could result in reduced prey abundance and diminished local carrying capacity for the kit fox.

Little information is available on the effects of contaminants on the San Joaquin kit fox. The effects may be difficult to detect. Morbidity (signs of harm) or mortality (death) would likely occur after the animals had left the contaminated site, and more subtle effects such as genetic damage could only be detected through intensive study and monitoring. However, effects have been detected on some occasions. At the Naval Petroleum Reserve, three kit foxes are known to have been killed by drowning in spills of crude oil (Cypher et al. 2000). Spiegel and Disney (1996) reported that a kit fox was found covered with crude oil at the Midway-Sunset oil field and this individual died despite treatment. Other animals, some of which were prey species for the kit fox, were found drowned in crude oil at the Naval petroleum reserve (U.S. Department of Energy 1993). Such spills potentially can cause local reductions in the abundance of kit foxes and their prey.

Disturbed areas adjacent to roads provide favorable habitat conditions for a number of non-native plant species. Some of these taxa are aggressively invasive and can alter natural communities and potentially affect habitat quality. A problematic species within the range of the San Joaquin kit fox is yellow star thistle (*Centaurea melitensis*). Dense stands of this plant can form along roadsides and then spread into adjacent habitat. This plant displaces native vegetation and competes with native plants for resources. It also does not appear to be used by kit fox prey and start thistle often forms dense, spiny thickets that may be difficult for kit foxes to move through

(Cypher 2000). Other invasive plant species that often benefit from road-side disturbance include mustards (*Brassica* species) and Russian thistle (*Salsola tragus*) (Tellman 1997).

Disturbed soils and reduced competition from native plants are some of the conditions that facilitate invasion along roadways by non-native plant species. Nitrogen from vehicle exhaust is deposited in habitats adjacent to roads, and the resulting enhanced nitrogen levels appear to promote growth of non-native species, particularly exotic grasses (Weiss 1999). These grasses, such as red brome (*Bromus madritensis rubens*) create dense ground cover in the San Joaquin Valley, and this dense cover appears to reduce habitat quality for various small mammal species, such as kangaroo rats, which are an important prey for kit foxes (Goldingay et al. 1997; Cypher 2000).

California Tiger Salamander and California Red-legged Frog

The proposed project could have direct effects to the California tiger salamanders and the California red-legged frogs through direct mortality, injury, or harassment of individual immature adults and adults. According to the July 2005 and November 2005 biological assessments for this project, no permanent or seasonal wetlands or ponds appropriate for California tiger salamander or California red-legged frog breeding would be affected by the proposed action. However, implementation of the proposed action would result in the temporary loss of 19.77 acres (8.00 hectares) and permanent loss of 4.03 acres (1.63 hectares) of habitat of both the California red-legged frog and the California tiger salamander.

Mortality, injury, or harassment of the California tiger salamander and the California red-legged frog could occur from being crushed by earth moving equipment and other vehicles within the action area. Individuals of these two listed species also could fall into trenches, pits, or other excavations, and then be directly killed or unable to escape and be killed due to desiccation, entombment, or starvation. Individuals also may become trapped by plastic mono-filament netting used for erosion control or other purposes where they could be subject to death by predation, starvation, or desiccation (Stuart et al. 2001). Various conservation measures such as minimizing the total area disturbed by project activities, and properly constructing exclusionary fencing may reduce mortality, injury, or harassment.

Various other work activities associated with the proposed project also may adversely affect California tiger salamanders and California red-legged frogs. Trash left during or after project activities could attract predators to work sites, which could subsequently harass or prey on the animals. For example, raccoons, crows, and ravens are attracted to trash and also prey opportunistically on amphibians. Accidental spills of hazardous materials or careless fueling or oiling of vehicles or equipment could degrade water quality or habitat to a degree where salamanders and frogs are adversely affected. Some potential also exists for disturbance of habitat which could result in the spread or establishment on non-native invasive plant species. There is also a possibility that people working on the site, particularly the onsite biologists could introduce amphibian disease to habitat used by California tiger salamanders and California red-legged frogs.

Increased levels of vehicles and increased vehicle speeds could lead to an increased mortality level for the California tiger salamander and the California red-legged frog in the action area. The project could result in temporary habitat fragmentation. The results of fragmentation are inhibition of genetic exchange between populations and impediments to recolonization of habitats from which populations have been extirpated. Small, isolated populations are substantially more vulnerable to stochastic events (e.g., aberrant weather patterns, fluctuations in availability of food) and may exhibit reduced adaptability to environmental (natural or anthropogenic) changes. However, project design features such as the installation of new and enlarged culverts may provide enhanced passage for these amphibians under State Route 152.

Critical Habitat for the California Tiger Salamander

The proposed action is not expected to appreciably diminish or prevent the value of the proposed critical habitat for the California tiger salamander, or from sustaining its role in the conservation and recovery of the species. Caltrans is proposing to implement measures to restore the areas subject to a significant amount of cut and fill to pre-project conditions. There is currently an existing highway within the action area, and, due to the proposed restoration activities, realigning a section of that highway will not significantly interfere with the current capability of the proposed critical habitat to satisfy essential requirements of the species. Constituent elements for the California tiger salamander will remain intact during and after project completion, or will be restored, and will continue to provide suitable habitat.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Numerous non-Federal activities continue to negatively affect the San Joaquin kit fox, California tiger salamander, and California red-legged frog in the action area. Habitats are lost or degraded as a result of road and utility construction and maintenance, overgrazing, agricultural expansion, and water irrigation and storage projects that may not be funded, permitted, or constructed by a Federal agency. Other threats include contamination, poisoning, increased predation, and competition from non-native species associated with human development. Small private actions that may impact listed species, such as conversion of land, small mammal population control, mosquito control, and residential development, may occur without consultation with or authorization by the Service or the California Department of Fish and Game pursuant to their respectively Endangered Species Act.

From 1995 to 2020, the human population is projected to increase by 18 percent for the San Francisco Bay hydrologic region while at the same time agricultural crop land use in the region is projected to remain around 65,000 acres (California Department of Water Resources 1998). According the California Department of Forestry, from 2000 to 2020, the human population within counties in the Bay Area region is expected to grow by 29 percent (5.3 million people to 6.8 million people), and by 60 percent from 2000 to 2040 (5.3 million people to 8.4 million people) (California Department of Forestry 1998). There will likely be many other development projects that occur during this timeframe due to increases in human population growth that will continue to imperil the San Joaquin kit fox, the California tiger salamander, and the California red-legged frog.

There is a continued demand for new housing in Santa Clara County and San Benito County. Considering this, the remaining open space adjacent to the State Route 152 is likely threatened by development. Development of adjacent wildlife habitat will continue to result in the loss of not only breeding, resting, and foraging habitat, but the loss of dispersal corridors between breeding populations, thereby further isolating and fragmenting wildlife populations. Additionally, development of small reservoirs or water bodies, such as golf course hazards, and water diversions may occur which may pose further threats such as disruption of dispersal corridors for terrestrial species, and competition or predation from with non-native species such as bullfrogs for aquatic species.

Cumulative effects to the San Joaquin kit fox, California tiger salamander, and California red-legged frog include continuing and future conversion of suitable breeding, foraging, sheltering, and dispersal habitat resulting from urban development. Additional urbanization can result in road widening and increased traffic on roads that bisect habitat, thereby increasing road-kill while reducing in size and further fragmenting remaining habitats.

California tiger salamanders and California red-legged frogs likely are exposed to a variety of pesticides and other chemicals throughout their ranges. These two amphibian species could also die from starvation due to the loss of their prey base. Hydrocarbon and other contamination from oil production and road runoff; the application of numerous chemicals for roadside maintenance; urban/suburban landscape maintenance; and rodent and vector control programs may all have negative effects on tiger salamander populations. In addition, tiger salamanders and red-legged frogs may be harmed through increased road kill due to the construction and use of new roads and increased traffic in the overall region and collection by amphibian enthusiast and others.

Further habitat fragmentation; additional non-native species introduction; and increased access to aquatic habitat could facilitate or increase the spread of amphibian diseases within the range of the California tiger salamander and the California red-legged frog.

Conclusion

After reviewing the current status of the San Joaquin kit fox, California tiger salamander, and California red-legged frog; the environmental baseline for the action area; the effects of the proposed State Route 152 Safety Operational Improvements Project and the cumulative effects; it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of these three listed species. Critical habitat for the San Joaquin kit fox has not been proposed or designated, therefore, none will be affected by the proposed project. Critical habitat for the California tiger salamander will not be adversely modified or destroyed and the proposed project is not anticipated to appreciably diminish the value of the critical habitat, or prevent the critical habitat from sustaining its role in the conservation and recovery of the species. The Service reached the conclusion on the effects on the critical habitat of the California tiger salamander because the effects of the project will be offset by the conservation measures in the project description, including the successful restoration of areas subject to the temporary effects of cut and fill to pre-project conditions. Proposed critical habitat for the California red-legged frog was removed from the action area following the Service's announcement of revised proposed critical habitat on November 3, 2005.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by FHWA so that they become binding conditions of any grant or permit issued to Caltrans as appropriate, in order for the exemption in section 7(o)(2) to apply. FHWA has a continuing duty to regulate the activity covered by this Incidental Take Statement. If FHWA (1) fails to require Caltrans to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service expects that incidental take of the San Joaquin kit fox will be difficult to detect or quantify for the following reasons: The nature of the species and its cryptic behavior make the finding of an injured or dead individual unlikely, and the animal occurs in habitat that makes it difficult to detect. Due to the difficulty in quantifying the number of San Joaquin kit fox that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as all of the San Joaquin kit foxes inhabiting or utilizing the 29.70 acres (12.02 hectares) (permanent effects = 9.95 acres [4.03 hectares]; temporary effects = 19.75 acres [8.00 hectares]) of appropriate habitat identified in the action area. The incidental take will be in the form of harm and harassment due to habitat loss and degradation, and construction-related disturbances.

As stated in the California Department of Fish and Game Code Section 2080.1, FHWA is advised to submit this incidental take statement for the San Joaquin kit fox to the Director of Fish and Game for a consistency determination. FHWA may be required to apply for a State Incidental Take Permit for the San Joaquin kit fox under section 2081(b) of the Fish and Game Code if the California Department of Fish and Game determines that this Federal document is not consistent with the California Endangered Species Act.

The Service anticipates that incidental take of the California tiger salamander will be difficult to detect because when this amphibian is not in their breeding ponds, or foraging, migrating, or conducting other surface activity, it inhabits rodent burrows or other underground refugia; upland refugia may be located a distance from the breeding ponds; upland migrations primarily occur on a limited period during rainy nights in the fall, winter, or spring; and the finding of an injured or dead individual is unlikely because of its cryptic nature and relatively small body size. Losses of this species may also be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in the water regime at their breeding ponds, or additional environmental disturbances. Due to the difficulty in quantifying the number of California tiger salamander that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as all of the California tiger salamander inhabiting or utilizing the 29.70 acres (12.02 hectares) (permanent effects = 9.95 acres [4.03 hectares]; temporary effects = 19.75 acres [8.00 hectares]) of California tiger salamander upland habitat identified in the action area. The incidental take is expected to be in the form of capture, harm, harassment, injury, and mortality to adult California tiger salamanders from habitat loss/degradation, construction-related disturbance, and capture and relocation.

The Service anticipates that incidental take of the California red-legged frog will be difficult to detect for the following reasons: their relatively small body size make the finding of a dead specimen unlikely; the secretive nature of the species; losses may be masked by seasonal fluctuations in numbers or other causes; and the species occurs in habitats that makes it difficult to detect. Due to the difficulty in quantifying the number of California red-legged frogs that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as all of the California red-legged frogs inhabiting or utilizing the 29.70 acres (12.02

hectares) (permanent effects = 9.95 acres [4.03 hectares]; temporary effects = 19.75 acres [8.00 hectares]) of California red-legged frog upland habitat identified in the action area. The incidental take is expected to be in the form of capture, harm, harassment, injury, and mortality to adult California red-legged frogs from habitat loss/degradation, construction-related disturbance, and capture and relocation.

Upon implementation of the following reasonable and prudent measures incidental take associated with the proposed action described above for the San Joaquin kit fox, California tiger salamander, and California re-legged frog will become exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the San Joaquin kit fox, California tiger salamander, and California red-legged frog is not likely to jeopardize the continued existence of these three species. Critical habitat for the San Joaquin kit fox has not been proposed or designated, therefore, none will be affected. Critical habitat for the California tiger salamander will not be adversely modified or destroyed and the proposed project is not anticipated to appreciably diminish the value of the critical habitat, or prevent the proposed critical habitat from sustaining its role in the conservation and recovery of the species. Proposed critical habitat for the California red-legged frog was removed from the action area following the Service's announcement of revised proposed critical habitat on November 3, 2005.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the effect of the proposed action on the San Joaquin kit fox, California tiger salamander, and California red-legged frog:

1. Caltrans will implement the conservation measures in the project description as described in the July 2005 and November 2005 biological assessments and this biological opinion.

2. Reduce adverse effects to the San Joaquin kit fox, California tiger salamander, and California red-legged frog.

3. Caltrans shall ensure their compliance with this biological opinion.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, FHWA shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1):

   a. Caltrans shall minimize the potential for harm, harassment, or killing of federally listed wildlife species resulting from project related activities by implementation of the conservation measures as described in the July 2005 and November 2005 biological assessments, and appearing in the Project Description of this biological opinion.

   b. Caltrans shall include Special Provisions that include the Conservation Measures and the Terms and Conditions of this biological opinion in the solicitation for bid information. In addition, Caltrans shall educate and inform contractors involved in the project as to the requirements of the biological opinion.

2. The following Terms and Conditions implement Reasonable and Prudent Measure two (2):

   a. The Resident Engineer or their designee shall be responsible for implementing the conservation measures and Terms and Conditions of this biological opinion and shall be the point of contact for the project. The Resident Engineer or their designee shall maintain a copy of this biological opinion onsite whenever construction is taking place. Their name and telephone number shall be provided to the Service at least thirty (30) calendar days prior to groundbreaking at the project. Prior to ground breaking, the Resident Engineer must submit a letter to the Service verifying that they posses a copy of this biological opinion and have read the Terms and Conditions.

   b. A qualified biologist(s) shall be onsite during all activities that may result in the take of the San Joaquin kit fox, California tiger salamander, and/or California red-legged frog. The qualifications of the biologist(s) must be presented to the Service for review and written approval prior to ground-breaking at the project site. Prior to approval, the biologist(s) must submit a letter to the Service verifying that they posses a copy of this biological opinion and understand its Terms and Conditions. The biologist(s) will keep a copy of this biological opinion in their possession when onsite. The biologist(s) shall be given the authority to stop any work that may result in take of these listed animal species. If the biologist(s) exercises this authority, the Service and the California Department of Fish and Game shall be notified by telephone and electronic mail within one (1) working day. The Service contact is Chris Nagano, Deputy Assistant Field Supervisor, Endangered Species Division at the Sacramento Fish and Wildlife Office at telephone (916) 414-6600.

   c. The Caltrans biologist shall have oversight over implementation of all the Terms and Conditions in this biological opinion, and shall have the authority to stop project activities, through communication with the Resident Engineer or their designee, if any of the requirements associated with these Terms and Conditions are not being fulfilled. If biologist/construction liaison has requested a stop work due to take of any of the listed species the Service and the California Department of Fish and Game will be notified within one (1) working day via email or telephone.

d. Prior to any ground disturbance, pre-construction surveys shall be conducted by a Service-approved biologist for the San Joaquin kit fox, California tiger salamander, and California red-legged frog. These surveys shall consist of walking surveys of the project limits and adjacent areas accessible to the public to determine presence of the species.

e. Only Service-approved biologist(s) who are familiar with the biology and ecology of the California tiger salamander and California red-legged frog shall capture or handle theses listed species.

f. Biologists shall take precautions to prevent introduction of amphibian diseases to the action area by disinfecting equipment and clothing as directed in the October 2003 California tiger salamander survey protocol titled, Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander and the recommended equipment decontamination procedures within the Service's California Red-Legged Frog Survey Guidance. Both items are available at the Service's Sacramento office website (http://www.fws.gov/sacramento/es/protocol.htm). Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle salamanders or frogs after working in other aquatic habitats.

g. An employee education program covering the San Joaquin kit fox, California tiger salamander, and California red-legged frog must be conducted before groundbreaking for the State Route 152 Safety Operational Improvements Project. The program should consist of a brief presentation by the on-site biologist to explain endangered species concerns to all contractors, their employees, and agency personnel involved in the project. The program should include a description of the San Joaquin kit fox, California tiger salamander, and California red-legged frog and their habitat needs; an explanation of the status of these species and their protection under the Endangered Species Act; associated consequences of noncompliance with this opinion; and a description of the measures being taken to reduce effects to these species during project construction and implementation. An outline of the training program shall be submitted to the Chief of the Endangered Species Division at the Sacramento Fish and Wildlife Office within twenty (20) working days prior to the start of construction. Documentation of the training, including individual signed affidavits, will be kept of file and available on request.

h. Project employees shall be provided with written guidance governing vehicle use, speed limits on unpaved roads, fire prevention, and other hazards.

i. Permanent and temporary disturbances and other types of project-related disturbance to the habitats of the San Joaquin kit fox, California tiger salamander, and California red-legged frog shall be minimized to the maximum extent practicable by Caltrans. To minimize temporary disturbances, all project-related vehicle traffic shall be restricted to established roads, construction areas, and other designated areas. These areas also should be included in pre-construction surveys and, to the maximum extent possible, should be established in locations disturbed by previous activities to prevent further adverse effects.

j. The construction area shall be delineated with high visibility temporary fencing at least 4 feet (1.2 meters) in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment onto any sensitive areas during project work activities. Such fencing shall be inspected and maintained daily by the on-site biologist until completion of the project. The fencing will be removed only when all construction equipment is removed from the site. Actions within the project area shall be limited to vehicle and equipment operation on existing roads. No project activities will occur outside the delineated project construction area.

k. To prevent inadvertent entrapment of San Joaquin kit foxes, California tiger salamanders, and California red-legged frogs during construction, all excavated, steep-walled holes or trenches more than 2 feet (0.61 meters) deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the on-site biologist should immediately place escape ramps or other appropriate structures to allow the animal to escape, or the Service and/or California Department of Fish and Game shall be contacted by telephone for guidance. The Service shall be notified of the incident by telephone and electronic mail within one working day.

l. Project-related vehicles shall observe a 20-mile (32-kilometer) per hour speed limit within construction areas, except on County roads, and State and Federal highways; this is particularly important at night when the San Joaquin kit fox, California tiger salamander, and California red-legged frog are most active. To the maximum extent possible, night-time construction should be minimized. Off-road traffic outside of designated project areas shall be prohibited.

m. All grindings and asphaltic-concrete waste shall be stored within previously disturbed areas absent of habitat and at a minimum of 150 feet (45.7 meters) from any culvert, or drainage feature.

n. To eliminate an attraction to predators of the San Joaquin kit fox, California tiger salamander , and/or California red-legged frog all food-related trash items such as wrappers, cans, bottles, and food scraps must be disposed of in closed containers and removed at least once every day from the entire project site.

o. To avoid injury or death of the San Joaquin kit fox, California tiger salamander, and/or California red-legged frog, no firearms shall be allowed on the project site except for those carried by authorized security personnel, or local, State, or Federal law enforcement officials.

p. To prevent harassment, injury or mortality of San Joaquin kit fox, California tiger salamander, and/or California red-legged frog or destruction of their dens or burrows by dogs or cats, no canine or feline pets shall be permitted in the action area.

q. Biologist(s) will determine the presence of San Joaquin kit fox dens (natural or in pipes and culverts) within the action area by performing the following:

(1) Pre-construction surveys within the action area shall be conducted no more than 30 calendar days prior to the start of construction in accordance with the most current protocols approved by the Service and the California Department of Fish and Game.

(2) Surveys for dens shall be conducted by qualified biologists with demonstrated experience in identifying San Joaquin kit fox dens.

(3) Pipes and culverts shall be searched for kit foxes prior to being moved or sealed to ensure that an animal has not been trapped.

r. All potential San Joaquin kit fox dens shall be protected to the maximum extent practicable as determined by the on-site biologist.

s. The type (natal or non-natal) and status (occupied or unoccupied) of all Potential San Joaquin kit fox dens will be identified based on the extant Service guidance (Service 1999):

(1) A known den is any existing natural den or human-made structure for which conclusive evidence or circumstantial evidence can show that the den is used or has been used at any time in the past by the San Joaquin kit fox.

(2) A potential den is any natural den or burrow within the range of the species that has entrances of appropriate dimensions (4 to 12 inches [10.16 to 30.48 centimeters] in diameter) to accommodate San Joaquin kit foxes. Caltrans shall survey and investigate using photo-detection equipment, track plate, or other methods to

determine species utilization. If no information is collected that would indicate use by other species, the den will be treated as a potential kit fox den.

(3) A pupping den is any known San Joaquin kit fox den (as defined) used by kit foxes to whelp and/or rear their pups.

(4) An atypical den is any known San Joaquin kit fox den that has been established in, or in association with, a human made structure.

t. Caltrans shall identify and execute the following appropriate action(s) regarding notification, buffers, excavation and fill, or seal-off in regards to the San Joaquin kit fox:

(1) If an occupied natal den is visible or encountered within the project limits, or other accessible land, or on publicly accessible land within 1000 feet (304.8 meters) of the project construction area, the project will be constructed between August 1 and November 30 and the Service and the California Department of Fish and Game shall be contacted immediately, before any project action occurs.

(2) A buffer or exclusion zone shall be established to protect the physical den and surrounding habitat of unoccupied natal dens and all non-natal dens that can be avoided:

(a) Unoccupied natal dens shall be surrounded with a 200-foot (61-meter) buffer and the Service and the California Department of Fish and Game will be contacted. Occupied and unoccupied non-natal dens shall be surrounded with a 100-foot (30.5-meter) buffer.

(b) When occupied dens have been found on or near the project site, ground disturbing activities shall be restricted during the period of December 1 to July 31.

(c) During this period, project activities within 0.3 miles (0.48 kilometers) of occupied natal dens are prohibited. Buffer zones shall be delineated with a temporary fence or other suitable barrier that does not prevent disbursal of the fox. Alternatively, the project construction area can be delineated with temporary fence, flagging, or other barrier.

(3) Unless necessary for pedestrian or driver safety, the project site shall not be lighted between sunset and sunrise.

(4) Pipes or culverts with a diameter greater than 4 inches (10 centimeters) shall be capped or taped closed when it is ascertained that no San Joaquin kit fox is present. Any kit fox found in a pipe or culvert shall be allowed to escape unimpeded.

(5) If a natural den cannot be avoided and must be destroyed, the following guidelines shall be followed:

(a) Prior to the destruction of any den, the den shall be monitored for at least three consecutive days to determine its current status. Activity at the den shall be monitored by placing tracking medium at the entrance and by standard spotlighting detection techniques. If no kit fox activity is observed during this period, the den shall be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den shall be monitored for at least five consecutive days from the time of observation to allow any resident animal to move to another den during its normal activities. Use of the den can be discouraged during this period by partially plugging the entrance(s) with soil in such a manner that any resident animal can escape easily. Destruction of the den may begin when, in the judgment of a Service or Service-approved biologist, it is temporarily vacant, for example during the animal's normal foraging activities.

(b) All dens shall be excavated by hand, by or under the supervision of, a Service-approved biologist.

(c) The den shall be fully excavated and then filled with dirt and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If, at any point during excavation a kit fox is discovered inside the den, the excavation activity shall cease immediately and monitoring of the den shall be resumed. Destruction of the den may be resumed, when in the judgment of the Service-approved biologist, the animal has escaped from the partially destroyed den.

(d) Non-natal dens may be excavated at any time of the year. Natal dens shall only be excavated between August 15 and November 1.

u. Within ten working days of the completion of earthmoving, Caltrans will replace all excavated kit fox dens with artificial dens on a 2:1 basis. The location and design of the artificial dens will be approved by the Service prior to installation.

v. San Joaquin kit foxes are attracted to den-like structures such as pipes and may enter stored pipe becoming trapped or injured. All replacement pipes, culverts, or similar structures with a diameter of 4 inches (10 centimeters) or greater that are stored in the action area for one or more overnight periods must be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the Service has been consulted by telephone. If necessary, and under the direct supervision of the on-site biologist, the pipe may be moved once to remove it from the path of construction activity, until the fox has escaped.

w. Use of rodenticides and herbicides in the action area shall be utilized in such a manner to prevent primary or secondary poisoning of San Joaquin kit foxes, and the depletion of prey populations on which they depend. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other appropriate State and Federal regulations, as well as additional project-related restrictions deemed necessary by the Service or the California Department of Fish and Game.

x. Plastic mono-filament netting (erosion control matting) or similar material shall not be used at the project site because California tiger salamanders or California red-legged frogs may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

y. Upon completion of the proposed action, all San Joaquin kit fox, California tiger salamander, and California red-legged frog habitat subject to temporary ground disturbances, including storage and staging areas, temporary roads, etc. must be re-contoured, if appropriate, and revegetated with seeds and/or cuttings of appropriate plant species to promote restoration of the area to pre-project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be revegetated. Caltrans shall submit to the Service their draft proposal for the restoration and revegetation plan at least sixty (60) calendar days prior to initial ground breaking; the final plan shall be submitted for approval by the Service prior to ground breaking at the proposed project. To the maximum extent practicable (i.e., presence of natural lands), topsoil shall be removed, cached, and returned to the site according to successful restoration protocols. Loss of soil from run-off or erosion shall be prevented with straw bales, straw wattles, or similar means provided they do not entangle, block escape or dispersal routes of listed animal species. The draft and final plan shall contain specific quantifiable criteria to evaluate the success of the restoration. A biologist shall ensure that areas subject to temporary disturbance have been adequately restored, and this information is included under the final reports described in 3.b. of the Terms and Conditions of this biological opinion.

3. The following Terms and Conditions implement Reasonable and Prudent Measure three (3):

a. If requested, before, during, or upon completion of ground breaking and construction activities, Caltrans shall allow access by Service and/or California Department of Fish and Game personnel to the project site to inspect project effects to the San Joaquin kit fox, California tiger salamander, and California red-legged frog, and their habitats.

b. Caltrans shall submit a post-construction compliance report prepared by the on-site biologist to the Sacramento Fish and Wildlife Office within 60 calendar days following project completion or within 60 calendar days of any break in construction activity lasting more than 60 calendar days. This report shall detail (i) dates that construction occurred; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the San Joaquin kit fox, California red-legged frog, and California tiger salamander, if any; (v) occurrences of incidental take of any of these three species; (vi) documentation of employee environmental education; and (vii) other pertinent information. The reports shall be addressed to the Deputy Assistant Field Supervisor of the Endangered Species Program, Sacramento Fish and Wildlife Office.

c. Caltrans shall report to the Service any information about take or suspected take of listed wildlife species not authorized by this biological opinion. Caltrans must notify the Service via electronic mail and telephone within 24 hours of receiving such information. Notification must include the date, time, location of the incident or of the finding of a dead or injured animal, and photographs of the specific animal. The individual animal shall be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contacts are Chris Nagano, Deputy Assistant Field Supervisor, Endangered Species Program, Sacramento Fish and Wildlife Office at (916) 414-6600, and Special Agent, Scott Heard of the Service's Law Enforcement Division at (916) 414-6660.

Reporting Requirements

Injured San Joaquin kit foxes, California tiger salamanders, and/or California red-legged frogs must be cared for by a licensed veterinarian or other qualified person such as the on-site biologist; dead individuals of any of these three listed species should be preserved according to standard museum techniques and held in a secure location. The Service and the California Department of Fish and Game must be notified within one (1) working day of the discovery of death or injury to a San Joaquin kit fox, California tiger salamander, and/or California red-legged frog that occurs due to project related activities or is observed at the project site. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. The Service contacts are Chris Nagano, Deputy Assistance Field Supervisor, Endangered Species Program at the Sacramento Fish and Wildlife Office (916/414-6600), and Scott Heard, Resident Agent-in-Charge of the Service's Law Enforcement Division at 916/414-6660. The California Department of Fish and

Game contact is Mr. Ron Schlorff at 1416 9th Street, Sacramento, California 95814, (916) 654-4262.

Caltrans shall submit a post-construction compliance report prepared by the on-site biologist to the Sacramento Fish and Wildlife Office within sixty (60) calendar days of the date of the completion of construction activity. This report shall detail (i) dates that construction occurred; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the San Joaquin kit fox, California tiger salamander, and California red-legged frog, if any; (v) occurrences of incidental take of any of these three listed species, if any; (vi) documentation of employee environmental education; and (vii) other pertinent information.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

The Service requests notification of the implementation of any conservation recommendations in order to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats. We propose the following conservation recommendations:

1. Caltrans should assist the Service in implementing recovery actions identified in the *Recovery Plan for the California Red-legged Frog* (Service 2002).

2. Caltrans should assist the Service in developing and implementing recovery actions identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998).

3. FHWA and Caltrans should consider participating in the planning for a regional habitat conservation plan for the San Joaquin kit fox, California tiger salamander, California red-legged frog, other listed species, and sensitive species.

4. Caltrans should consider establishing functioning preservation and creation conservation banking systems to further the conservation of the San Joaquin kit fox, California tiger salamander, California red-legged frog, and other appropriate species. Such banking systems also could possibly be utilized for other required mitigation (i.e., seasonal wetlands, riparian habitats, etc.) where appropriate.

5. Sightings of any listed or sensitive animal species should be reported to the California Natural Diversity Database of the California Department of Fish and Game. A copy of the

reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service. Project-related surveys in 1999 resulted in California red-legged frog observations at the small pond near the east end of Segment D (Caltrans 2000). The occurrence information for these observations was not found in the December 2005 update of the California Natural Diversity Database. These California red-legged frog observations co-occur with occurrence 176 for the California tiger salamander (Caltrans 2005a) and should be reported to the California Natural Diversity Database.

6. Caltrans should incorporate culverts, tunnels, or bridges on highways and other roadways that allow safe passage by San Joaquin kit fox, California red-legged frog, California tiger salamander, other listed animals, and wildlife. Caltrans should include photographs, plans, and other information in their biological assessments if they incorporate "wildlife friendly" crossings into their projects.

7. Caltrans should provide habitat for bats, including surfaces for bat roosts on the underside of bridges and other structures whenever possible.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and/or proposed species or their habitats, the Service requests notification of the implementation of these recommendations.

REINITIATION--CLOSING STATEMENT

This concludes formal consultation on the proposed State Route 152 Safety Operational Improvements Project, Santa Clara County, California. As provided in 50 CFR §402.16 and in the terms and conditions of this biological opinion, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have questions concerning this opinion on proposed State Route 152 Safety Operational Improvements Project, Santa Clara County, California, you can contact this office at the letterhead address or at (916) 414-6600.

Sincerely,

Cay C. Goude
Acting Field Supervisor

cc:
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